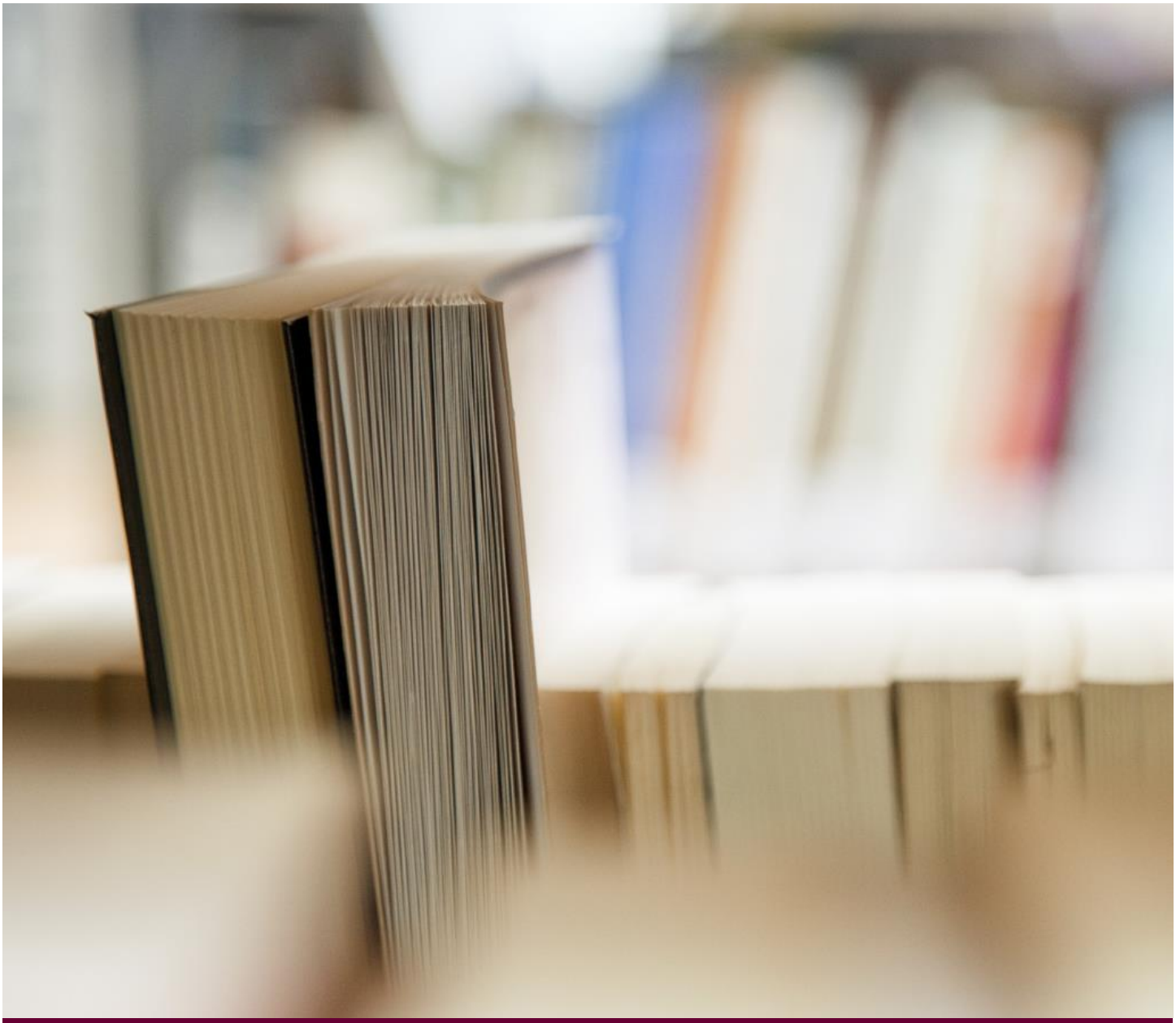


UNIT-03

INPUT OUTPUT (I/O) DEVICES

INTRODUCTION

- Input and output devices of a computer system are the devices that connect you to computer.
- Input devices let you to transfer data and user command into the computer system.
- I/O devices are used to interact with the computer system.
- For example, you can type in data by using a keyboard, or you can input data in picture form by using a scanner in computer system.
- Output devices display the result of input data or signals after processing it.
- Examples of these could be your computer's monitor, which displays all the programs which are running on the computer, as well as the printer, which will print out a hard copy of the information which is saved in your computer.
- Input and output devices allow the computer system to interact with the outside world by moving data into and out of the computer system.
- Examples of some input devices are:
    - Keyboard
    - Mouse
    - Touch screen
    - Voice input
    - Scanner
- An output device is used to send data out of the system.
- The user sees the result after processing of data by the computer through output devices.
- Examples of some output devices are:
    - Monitor
    - Printer
    - Plotter
    - Speaker

INPUT DEVICES

Input device enables the user to send data, information, or control signals to a computer. The Central Processing Unit (CPU) of a computer receives the input and processes it to produce the output.

1. KEYBOARD

- The keyboard is a basic input device that is used to enter data into a computer or any other electronic device by pressing keys.
- It has different sets of keys for letters, numbers, characters, and functions.
- Keyboards are connected to a computer through USB or a Bluetooth device for wireless communication.
- Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

THE KEYS ON THE KEYBOARD

1. ALPHANUMERIC KEYS

These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.

2. NUMERIC KEYPAD

It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.

3. FUNCTION KEYS

The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.

4. CONTROL KEYS

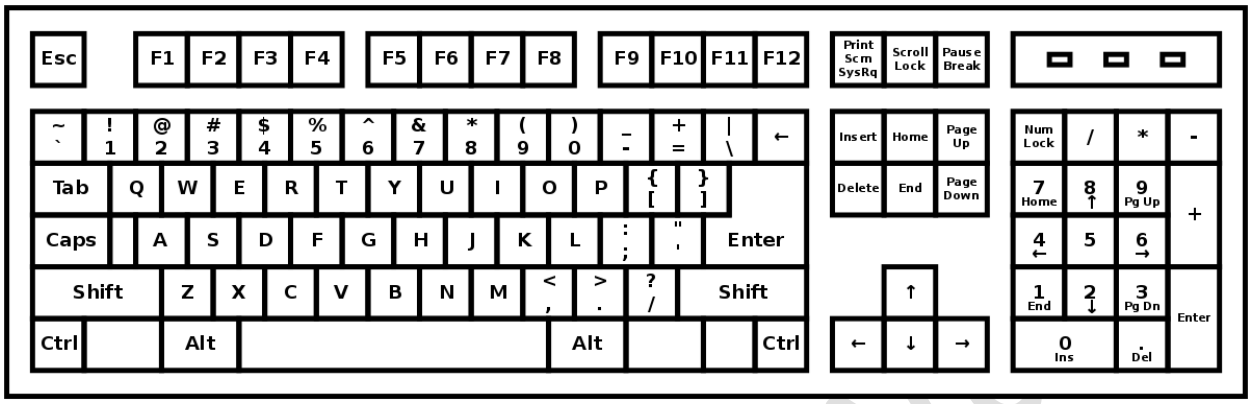
These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).

5. SPECIAL PURPOSE KEYS

Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

TYPES OF KEYBOARDS

1. QWERTY KEYBOARD



- It is the most commonly used keyboard with computers in modern times.
- It is named after the first six letters of the top row of buttons and is even popular in countries that do not use Latin-based alphabet.
- It is so popular that some people think that it is the only type of keyboard to use with computers as an input device.

2. DVORAK KEYBOARD

- This type of keyboard layout was developed to increase the typing speed by reducing the finger movement while typing.
- The most frequently used letters are kept in a home row to improve typing.

3. MULTIMEDIA KEYBOARD

- The keyboard that has all multimedia buttons is called multimedia keyboard.
- The buttons include play, pause, previous, next, volume up, volume down, mute and special button to launch media. Also, a button to launch a browser, my computer, and calculator is available.

4. VIRTUAL KEYBOARD

- The keyboard used in smartphones is called a virtual keyboard.
- This keyboard appears when needed and disappears when typing is completed. This can be automatically set as per need.
- Also in the windows system, we can use a virtual keyboard that appears on the screen. There is no physical object to carry for a virtual keyboard.

5. USB KEYBOARD

- Universal Serial Bus Keyboard has a USB stick with a wire which has to be inserted into the USB port of the system. And then the keyboard works well.

2. MOUSE

- It controls the movement of the cursor on the computer screen and allows users to move and select folders, text, files, and icons on a computer.
- It is an object, which needs to put on a hard-flat surface to use. When the users move the mouse, the cursor moves in the same direction on the display screen.

WHAT ARE THE USES OF A MOUSE?

1. MOVE THE MOUSE POINTER

- The main function of a mouse is to move the mouse cursor on the screen in the desired direction.

2. SELECT

- A mouse provides users the option to select the text, file, or folder and many files at once. For example, if you want to send multi file to anyone, you can select many files at once and can send them.

3. OPEN OR EXECUTE A PROGRAM

- You can open a folder, icon, or other objects by a mouse. You are required to move the cursor to a file, folder, or an icon, then double click on the object that you want to open or execute.

4. DRAG-AND-DROP

- When you select something, it can also be moved from one location to another by using the drag-and-drop method. In this method, first, you need to highlight the file or an object that you want to move. Then, move this file while pressing the mouse button and drop it on the desired location.

5. HOVERING

- When you move the mouse pointer on any object, hover changes the color of links, and by clicking on that link, you can go on the destination page.

6. SCROLL UP & DOWN

- If you are viewing a long web page or working with a large document, you need to scroll up or down a page. The mouse's scroll button helps to up and down your document page; otherwise, you can also click and drag the scroll bar.

7. PERFORM OTHER FUNCTIONS

- Most of the desktop mouse contains buttons, which can perform any function by programming them according to the requirement. For instance, on the thumb portion, many mouse have two side buttons that can be programmed to go back on web pages.

8. PLAYING GAME

- A mouse provides users the option to play various games like chase games, in which a mouse is used to select any particular objects.

TYPES OF MOUSE

1. OPTICAL MOUSE

- It is an advanced computer pointing device, first introduced by Microsoft on **19 April 1999**.
- It tracks movement by using a laser or light-emitting diodes (LEDs).
- It detects the movement by sensing changes in reflected light.
- It does not require cleaning as it has no moving parts.

2. JOYSTICK

- It is an input device that moves in all directions and controls a machine or a symbol in a computer program.
- It is much like a mouse, except that if you stop to move the mouse, the cursor will also stop. But with the joystick, the pointer does not stop and moves continuously in the direction the joystick has pointed.
- You must need to return the joystick to its upright position for stopping the pointer.
- In 1926, C. B. Mirick invented and patented the first joystick at the U.S. Naval Research Laboratory.
- It was originally designed for remotely piloted aircraft, and was a two-axis electronic joystick, much like to the joysticks still in use.
- Today, mostly joysticks connect with the computer by using a USB port. There are different types of ports that used to connect a joystick such as Bluetooth, Serial Port, USB, Game port.

3. MECHANICAL MOUSE

- It is a type of computer mouse, also called a ball mouse.
- It consists of a rubber or metal ball on its underside.
- It contains the sensors, when the user moves a mouse in any direction, the sensors inside the mouse detect the movement and move the mouse pointer on-screen in the same direction.
- An optical mouse took the place of the mechanical mouse. Furthermore, a mechanical mouse is similar in shape and function, but rather than on the ball; it depends on optical sensors that make it more reliable.

4. CORDLESS (WIRELESS) MOUSE

- It is an input device that connects to a computer without any wire.
- Wireless mouse started to include Bluetooth, infrared radio waves, and radio frequency technology.
- Commonly, a USB receiver is used to connect the computer with a wireless mouse, which is plugged into the computer and accepts signals from the wireless mouse.

5. TOUCHPAD

- It is a flat control surface, also known as a glide point, glide pad, trackpad, or pressure-sensitive tablet.
- It is used to move the cursor by using fingers. It is primarily found on laptops and used in place of an external mouse.

- It is designed to be operated with your finger. By dragging your fingertip across the touchpad's flat surface, you can move the mouse cursor in the desired direction on the screen.
- It also includes two buttons under the touch surface like the most computer mouse, which correspond to the left and right-click buttons, respectively.
- Some modern touchpads have multi-touch technology, which allows users to perform different actions by using their multiple fingers on the computer.
- For instance, some programs need to use two fingers to pinch and zoom on an image or a document. You can also use two fingers to rotate an image left or right.

6. TRACKBALL

- It is a hardware input device that acts the same function as a mouse, but it includes a moveable ball on the top that allows users to move the cursor in any direction. It is designed like an upside-down mouse, which needs less arm and wrist motion as compared to a regular mouse.
- Because, rather than moving the whole mouse, you are only required to roll the moveable ball until with your hand to generate motion input.

7. LIGHT PEN

- A light pen is a computer input device in the form of a light sensitive wand used in conjunction with a computer's CRT display.
- It allows the user to point to displayed objects or draw on the screen in a similar way to a touchscreen but with greater positional accuracy.
- Light Pen (similar to the pen) is a pointing device which is used to select a displayed menu item or draw pictures on the monitor screen.

8. STYLUS

- In computing, a stylus (or stylus pen) is a small pen-shaped instrument whose tip position on a computer monitor can be detected.
- It is used to draw, or make selections by tapping.
- While devices with touchscreens such as newer computers, mobile devices (smartphones and personal digital assistants, game consoles and graphics tablets can usually be operated with a fingertip.
- A stylus provides more accurate and controllable input. The stylus has the same function as a mouse or touchpad as a pointing device; its use is commonly called pen computing.

3. SCANNER

- This is an Electronic as well as an Input device that converts any type of physical data into digital data within a minute by eliminating manual data entry. They are able to scan Text, Pictures, Photos, and Etc.

TYPES OF SCANNER

1. Flatbed Scanner

- A flatbed scanner works similar to a copy machine except that it creates a file of the document in memory instead of a paper copy. This is the most popular and common type of scanner available in the market.
- Once an object is scanned, it can be displayed on the screen, stored on a storage medium, printed, faxed, attached to as an e-mail message, included in another document, and posted on a website or photo community for everyone to see.
- High-speed scanning, wireless scanning, easy file management are some pros of this flatbed scanning device.

2. Photo Scanner

- Photo scanners are the types of scanners especially used for scanning images, photos, and paintings.
- If you want a scanning device for photos you must go for a photo scanner because it gives high-quality scanning to your photos. The high resolution and color depth are the main features of this device.
- Flatbed is also able to scan photos but a photo scanner gives you premium results, that shouldn't be compared with other scanned photos.
- Some photo scanner has inbuilt image editing software that improves the quality of image, is the advantages of this.
- Scanner with image editing software can cost too high in front of others.

3. Document Scanner

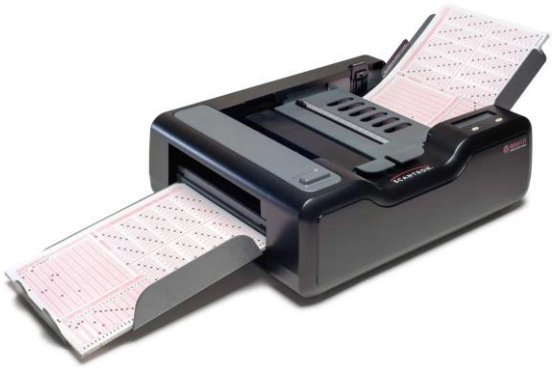
- Document or Sheetfed scanner are mainly used for scanning documents of different sizes without any problem.
- This is the best scanner option if you have to scan multiple pages means thousands of pager per day. It can easily scan too many pages a day and also have some inbuilt features to make scanning easy and efficient.
- More features mean more cost so this is the reason why a document scanner is costly than a flatbed.
- Capable of duplex scanning takes less space, quality is excellent are some features of this device.

4. Handheld Scanner

- **Portable scanners** that are easy to use and carry in your pocket.
- This is a device that is not similar to others in build design but similar in its work, this is a small rod kind of device that can be used by your hand called a handheld scanning device. This is the different types of scanner that are used today.
- It detects the result by focusing on the subject, it uses light sensors to read the subject and give the result.

5. OMR Scanner

- This device reads marks on specific areas of the page. It can identify hand-drawn marks such as small circles or rectangles made with pens or pencils.
- A person places these marks on a form, such as a test, survey, questionnaire, and answer sheet.
- For checking a test paper sheet, the Optical Mark Recognition devices first read the answer key sheet to record correct answers based on patterns of light. The OMR device then reads the remaining document and matches their patterns of light against the answer key sheet.
- OMR are the different types of scanners that are used to check the answer sheets of competitive exams.



6. Bar Code Scanner

- A bar code is a set of lines of different thickness that represent a number. A bar code reader also called a bar code scanner is used to input data from bar codes.
- Most products in the shops have bar codes on them. Bar code readers work by reflecting a beam of light on the lines that makes up the bar codes and identify the amount of light that is reflected.
- These are the different types of scanners only made for shops to scan the product's code and not made for personal or home use.

OUTPUT DEVICES

1. MONITOR

- One of the most important output devices in computer system is its screen commonly called monitor.
- It is an output device and displays all the programs and applications which are running on the computer system.
- A Monitor is the visual display unit of the computer system. It displays images generated from the video output. It displays images without keeping a permanent record.
- A Graphic display is made up of a series of dots called 'pixels' (picture elements) whose pattern produces images in computer system.

CLASSIFICATION OF MONITORS ON THE BASIS OF COLOR

- **MONOCHROME**
  - These monitors display the result in two colors, i.e., black/white, green/black, amber/black. One color is for the background of the screen and other for the foreground.
- **GRAY SCALE**
  - It is a monochrome type of monitor. But it displays the output by using different shades of gray, made by a combination of black and white.
- **COLOR MONITOR**
  - It can display the output in many colors, ranging from 16 to over 1 million different colors. These are also called as RGB monitors, because they accept three separate signals, which are red, green, and blue.

2. PRINTERS

Printers are used for producing output on paper. There are a large variety of printers and printing devices which can be classified according to the print quality and printing speed.

TYPES OF PRINTERS

Printers can be grouped into two categories. They are as follows: –

- Impact Printers
- Non-Impact printers

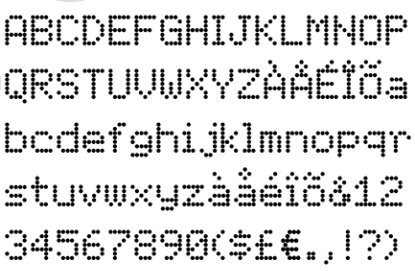
1. IMPACT PRINTERS

- Impact printers are printers which works by creating a direct contact between ink ribbon and paper. These printers are noisy yet popular. Impact printers have mechanical moving parts to conduct printing.
- Examples: Character printer and line printer

CHARACTER PRINTER

1. Dot-Matrix Printers

- The dot-matrix printer uses 9 to 24 pin print heads. Such pins generate dot patterns to shape the individual characters on the page.
- The dot-matrix printer of 24 pins produces more dots than a dot-matrix printer of 9 pins, which results in much better quality and clearer characters.
- The basic rule is that the more pins the letters on the document are clearer.
- The pins hit the ribbon individually as the printing mechanism travels in both directions along the entire print line, from left to right, then right to left, and so on.
- With a dot-matrix printer, the user can generate a color output.
- Dot-matrix printers are inexpensive and usually print at speeds of between 100 and 600 characters per second.



2. Daisy-Wheel Printers

- A daisy-wheel impact printer can be used to get quality found in typewriters.
- It is called a daisy-wheel printer because the printing mechanism looks like a daisy; a completely formed character at the end of each “Petal” creates a solid line print.
- A hammer hits a “petal” with a character against the ribbon, and it prints on the paper. Its speed is usually about 25-55 characters per second.
- Working of daisy wheel printer

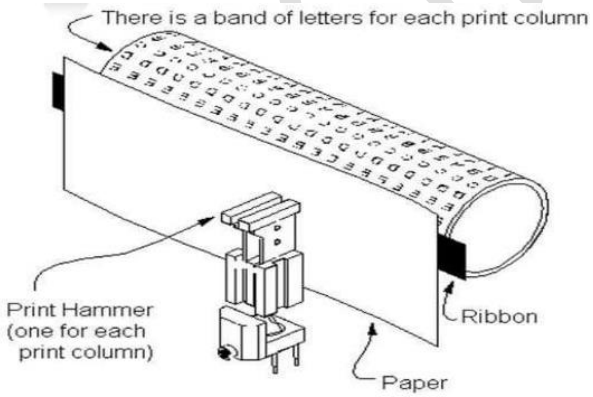

Daisy Wheel Printer

LINE PRINTERS

- The character-at-a-time printers are too slow in a business where large quantities of material are printed; therefore these users need line-at-a-time printers.
- Line printers, or line-at-a-time printers, use special devices that can print a whole line at once; usually, they can print the range from 1,200 to 6,000 lines per minute.
- Drum printers, chain printers are line-in-time printers.

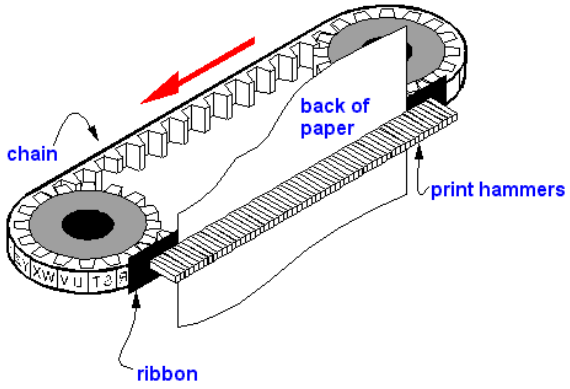
1. Drum Printer

- A drum printer is a large, cylindrical drum that has raised characters on its surface in strips.
- The number of print positions over the drum is equal to the number on the paper. Usually, the number ranges from 80-132 print positions.
- The drum rotates at a strong speed. A print hammer is placed behind the paper for each possible print position.
- Those hammers hit the paper against the proper character on the drum as it moves along the ink ribbon.
- Pressing each line requires one drum revolution. Typical drum printer speeds are between 300 and 2000 lines per minute.



2. Chain Printer

- A chain printer uses a print chain, wrapped around two pulleys. Like the drum printer, every print location has one hammer.
- Circuitry within the printer can detect when the correct character appears on the page at the appropriate print spot.
- The hammer then hits the sheet, pressing the paper against a ribbon, and at the desired print place the character is placed.
- The page left an impression of the character. The chain continues to rotate until all the print positions needed on the line have been filled.
- The page then goes up to the next line to print. Chain printer speeds vary between 400 and 2500 characters per minute.



2. NON-IMPACT PRINTERS

Non-Impact printers don't uses any direct contact between ink ribbon and paper. These printers are less noisy and don't have mechanical moving parts to conduct printing

Examples: Inkjet printers and Laser printers.

1. Ink-Jet Printers

- In the inkjet printing mechanism, the print head has several tiny nozzles, also called jets.
- As the paper moves past the print head, the nozzles spray ink onto it, forming the characters and images.
- An inkjet printer can produce from 100 to several hundred pages, depending on the nature of the hard copy, before the ink cartridges must be replaced. There is usually one black ink cartridge and one so-called color cartridge containing ink in primary pigments (cyan, magenta, and yellow).
- Some inkjet printers use a single cartridge with cyan, magenta, yellow, and black ink. A few models require separate cartridges for each primary pigment, along with a black ink cartridge.

2. Laser Printers

- Laser printers have become another familiar laser-based consumer product, often used in conjunction with personal computers.
- Their principle of operation involves electrophotography, also called xerography, the same process that is used in photocopy machines.
- During printing, the laser will scan the page line by line. There are four laser printer subtypes available, including monochrome, strong ink, single coloring, and four colorings.
- The generally accepted writing method is black and white lasers, which offer content in black text.
- The users who only print pictures from time to time would probably use the laser color printer.

3. PLOTTERS

- A Plotter is a device that draws pictures on a page as output, after receiving a print command from the computer. It is also called a graph plotter.
- In plotters pens are used to draw lines on the paper, which is placed in the plotter.
- Plotters produce high quality diagrams on the paper and their output quality is good.
- Engineers, architects and planners use plotters to generate high quality, high-precision graphic output of different sizes.
- For several design applications such as design of layout of an aircraft, car, and architectural design of a building and in other computer-aided design applications plotter are very useful.

4. SPEAKER

- Computer speakers, or multimedia speakers, are external speakers, commonly equipped with a low-power internal amplifier which produces sound as output. External speakers are connected with a computer by using a plug and socket.
- Computer speakers range widely in quality and in price. Laptop computers have inbuilt speakers.

5. HEADPHONES

- Headphones are a pair of small loudspeaker drivers worn on or around the head over a user's ears.
- They are electroacoustic transducers, which convert an electrical signal to a corresponding sound.
- Headphones let a single user listen to an audio source privately, in contrast to a loudspeaker, which emits sound into the open air for anyone nearby to hear. Headphones are also known as ear speakers, earphones.
- Headphones use a band over the top of the head to hold the speakers in place. Another type, known as earbuds or earpieces consist of individual units that plug into the user's ear canal.