

CHAPTER # 3 “INPUT & OUTPUT DEVICES”

Q1. Define input devices? Explain the Primary text input device in detail?

Ans: INPUT DEVICES

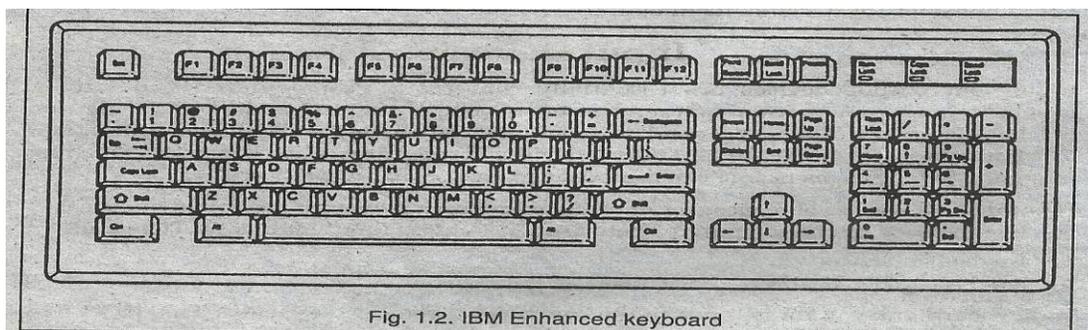
Input devices enable a user to input data or command into the computer. Physical equipment is used to read and translate data consisting of alphabets, numbers or symbols into electronic impulses or computer understandable format. Communication with computer requires some input devices by translating the input information into machine codes. Used to feed programs and data to a computer through various input devices such as keyboard, mouse, joystick, trackball, lightpen, magnetic ink character reader, optical character reader, scanner etc.

Input Devices are classified into Four types

1. Keyboard Devices
2. Non-Keyboard or Pointing Devices
3. Scanners
4. Sensors

KEYBOARD (Primary Input Device)

Keyboard is the **primary text input device** which serves the purpose of communication with computer. It consists of a set of keys for entering any sort of text data into the computer. Keyboard uses the similar keys arrangement as the mechanical and electronic typewriter keyboard used. The standard arrangement of alphabetic keys is known as ‘**QWERTY**’. The name is derived from the arrangement of five keys at the left of the upper first row of alphabetic keys. Pressing a key of keyboard sends an electrical signal to the microprocessor. A **standard keyboard includes about 100 keys** and each sends a different signal to the C.P.U.



DIVISIONS OF THE KEYBOARD

Keyboard for the personal computer come in many different styles that differ in size, number of keys and shape .Most keyboards are designed identically except for few functional keys. Keys are arranged in the following categories:

1. ALPHANUMERIC KEYPAD: It's the central main keypad **look like typewriter**. Letters, numbers and special characters can be entered through this keypad. It also has some special keys for specific functions such as **Backspace** key to delete a character, **Caps lock** key to produce only capital letters, **Enter key** issues a command or place the cursor on a new line.

2. NUMERIC KEYPAD: It's present on the right side of the keyboard. It includes numbers from 0 to 9, four basic operators (+, -, *, /), decimal point and numlock key. **Num Lock** keys work similar to Caps lock key. Numbers can only be entered when Numlock key is on. When Numlock key is deactivated, the numeric keypad's keys perform cursor movement and control functions such as page up, page down, insert, delete etc.

3. FUNCTION KEYS: In enhanced keyboards, there is a set of function keys from F1 to F12 located at the top of the keyboard. In older keyboards there were only 10 function keys at the left side. Each key has a specific pre-defined function or command to input, depending on the program or software in use. F1 key is mostly used in programs as helping key

Example: Mostly F5 key is used to refresh the desktop. Similarly in GWBASIC:

F1----- to display program listing

F2 ----- to execute the program etc.

4. SCREEN NAVIGATION KEYS: A blinking mark on the screen is called cursor. Cursor control keys are used to move the cursor around the screen. Most keyboards include the following cursor movement keys:

ARROW KEYS: The four keys; Left, Right, Up and Down moves the cursor in the four respective directions.

HOME and END: Home key moves the cursor to the beginning of the line while End Key moves the cursor to the end of the line.

PAGE UP and PAGE DOWN: Page up key moves the cursor to the previous page or screen. Page down key moves the cursor to the next page.

MODIFIER KEYS: These keys modify the input of other keys. Some Modifier keys are Shift, Ctrl, and Alt. One of these modifier keys when pressed with some other keys performs specific function. Delete Key is used to delete a character, Insert key when activated will allow to insert text. Esc key varies from program to program. Print Screen key capture whatever on screen as image

Q2. Explain Mouse and Trackball?

Ans: MOUSE

The mouse is also a primary input device / pointing device it **lack text transmission**. It is also called as pointing device that is used to move a **mouse pointer** on the computer screen in order to point at the specific place on the screen. First time widely used with **Apple Computers (Macintosh)** by **Douglas Enlerbert** It is also used to select options or to draw lines. As it moves, it moves the cursor on the screen to anywhere. Mouse is an elementary input device essential to operate many programs. It is an integral part of the GUI (Graphical User Interface) of any personal computer.

STRUCTURE: A mouse consists of a metal or plastic housing or casing, a ball at its base, one or more buttons on the top of the casing and a cable that connects the mouse to the computer. But now we may find a wireless mouse as well.

FUNCTION: As the ball inside the mouse rolls on the flat surface and rubs against the two cylinders, the cylinder moves and the emitted light and sensor sends the signals to the computer.

TRACKBALL: A trackball is a pointing device that looks like upside down mouse. The trackball has the same function as that of the mouse, but it does not have to be rolled over a flat surface. A trackball is used by rolling the ball with palm or fingers in the direction where the pointer has to be moved. Trackball has 1 to 3 buttons. Unlike mouse it does not require much space to move Trackball is

stationary. Trackballs are popular among heavy computer users as they cause less strain on hands and wrists than a regular mouse.

Q3. Differentiate between Mouse and Trackball?

	MOUSE	TRACKBALL
1	Mouse has to be moved on a flat surface.	Trackball does not need to be rolled over a flat surface.
2	While working with mouse whole device has to be moved.	In trackball only the ball is moved with palm or fingers.
3	Mouse needs some space to be moved.	Whereas trackball is stationary. It does not require much space to be used.
4	Movement of mouse causes heavy strain on the wrist.	Trackball causes less strain on hand and wrist.
5	Ball is optional user can have optical mouse	Ball is compulsory for trackball
6	Mouse is moveable and commonly use	Trackball is stationary but rarely used
7	Popular among light computer users	Mostly used by Heavy computer users like CAD/ CAM/ Graphics Designers

Q4. Define Scanner and its types?

Ans: SCANNER

Scanner is an input device that reads images or text and converts the data into digital signals, which can be directly fed and stored in computer. Graphical scanners read photos or other images into the computer and digitalize them. Text scanner use optical character recognition software to read pages of text and produce editable text files. Some major manufactures of scanner include: Epson, Hewlett-Packard & Microtec. Scanner mostly comes with software such as Adobe Photoshop product.

Some most common types of scanners are:

- 1) Hand Held Scanners
- 2) Flatbed Scanners
- 3) Sheet Fed Scanners

HAND-HELD SCANNER

A scanner that is held in the hand and passed across the image to be scanned is called hand held scanner. It is very small in size. Hand held scanners are less expensive, but require a steady hand to get a clear image. It has to be held in hand to scan the picture placed on a flat surface. They are easy to use but they can scan only 4.1 inches of picture maximum. Latest scanner can scan wide pictures in two steps; first the right side and then the left side. Computer stitches these two images into a single image.

FLAT BED SCANNER

It has a flat piece of glass. The image is placed up side down on the flat bed surface to scan it. A mechanism is moved over image surface which scans and produce signal for the computer. The mechanism is similar to a photocopier machine. They are expensive and powerful.

In flat bed scanner the document is stationary and a mechanically operated scanning head moves beneath the glass. This has eliminated the problem of holding the scanner steady in hand held scanner.

SHEET FED SCANNER

A sheet fed scanner can scan only single sheet of a paper. A sheet fed scanner can not be used to scan pages from books and magazines also can not scan pasted papers/pages

Q5. Define Joystick and Light Pen?

Ans: JOYSTICK

Joystick is a hand held stick like the joystick in an airplane, which is used as a pointing device. It is an input device which controls the movement of certain objects on the screen. Joystick is just like a vertical handle or gear of a car. It has push buttons at the top and the base of the handle. These buttons are used for firing or hitting objects on the screen and they are called triggers. Joysticks are mostly used for computer or video games but they are also used occasionally for **CAD / CAM systems** and other applications. Different manufacturers produce different shapes of joysticks called game pads.

LIGHT PEN

A light pen is a pointing device that is used for engineering designing. It draws fine quality pictures on the screen. The pen consists of a photocell placed in a small tube. **Photocell** responds when pen is directly pointed at lightened area. This electrical response is then send to the computer. A light pen is approximately **3.5 inches long and 0.5 inch in diameter**. It has a switch and a cord or lead or wire that connects it to the computer. In some light pens switch is built in to the tip so that, it would be activated when the pen is pressed against the screen.

MICROPHONE

Microphone is standard set for important updated input full multimedia system to record voice/speech. User need voice input device most often where presenter want to get benefit from narration also used for making telephone calls from computer and useful for arrangement of audio/video conference through internet.

Q6. Define Monitors, its Types and Classification?

Ans. MONITORS

To display results or output from computer, a T.V. like device is used and called “Monitor”. It’s also called a display screen .The monitors are also referred as CRT (Cathode Ray Tube), VDT (Video Display Terminal) or VDU (Video Display Unit). Monitor assist during input from the keyboard. It also displays all normal an error messages. The displayed output is called a “Softcopy” of information. The program can be typed or edited very easily by the help of monitor. It is a device that displays text and graphics generated by a computer.

TYPES OF MONITORS

The basic two types of monitors are:

- 1) **CRT:** Monitor which is similar to the television screen and also works in the same way, uses a large vacuum tube called Cathode Ray Tube (CRT).
- 2) **FLAT PANEL DISPLAY:** (Liquid Crystal Display or LCD) which is usually used with portable computers but now have become very popular with the desktop PC’s as well.

CLASSIFICATION OF MONITOR

There are many ways to classify monitors:

CLASSIFICATION ACCORDING TO PURPOSE

- 1) General Purpose Monitor
- 2) Advanced Purpose Monitor
- 3) Special Purpose Monitor

CLASSIFICATION ACCORDING TO COLOR

In terms of color capabilities, monitor fall into following 3 classes:

(a) **Monochrome:** These monitors actually display two colors, one for the background and one for the foreground. The colors can be black and white, green and black, or amber and black.

(b) **Gray Scale:** A gray scale monitor is a special type of monochrome monitor capable of displaying different shades of gray.

(c) **Color:** These monitors can display from 16 to 1 million different colors. They accept 3 separate signals Red, Green and Blue that's way they are called RGB monitors.

CLASSIFICATION ACCORDING TO SIZE

Like televisions, screen sizes of monitors are measured in diagonal inches, the distance from one corner to the opposite corner diagonally. A typical size for small monitors is 14 inches. 16 inches monitors are often called full page monitors. In addition to this monitors can be either portrait or landscape.

Q7. What are the factors which determine a monitor's quality?

Ans. FACTORS DETERMINING MONITOR'S QUALITY

- Resolutions** The resolution of a monitor indicates how densely packed the pixels are.
In general, high resolution provides a sharper image.
- Bandwidth** The range of signal frequencies the monitor can handle. This determines how much data it can process.
- Refresh rate** How many times per second the screen is refreshed. To avoid flickering, the refresh rate should be at least 72 Hz
- Dot pitch** The amount of space between each pixel. The smaller the dot pitch, the sharper the image.
- Convergence** The clarity and sharpness of each pixel.

Q8. What are the Characteristics of a printer?

Ans. CHARACTERISTICS OF A PRINTER

Printers are also classified by the following characteristics:

Quality of print: The output produced by printers is said to be either LQ- letter quality like typewriter, NLQ- near letter quality or DQ -draft quality.

Speed: Measured in character per second (cps), lines per minute (lpm), or pages per minute (ppm). If you do much printing, the speed of the printer becomes important.

- Daisy Wheel Slowest – 30 cps
- Line printer - 3000 lpm
- Dot Matrix - 500 cps
- Laser Printer - 4-20 ppm

Graphics: Some printers can print only text. Other printers can print both text and graphics.

Fonts: Some printers are limited to one or a few fonts. In contrast, the other printers are capable of printing almost unlimited variety of fonts.

Color: Printers can produced color print out for users who need to print pages for presentation, maps and information.

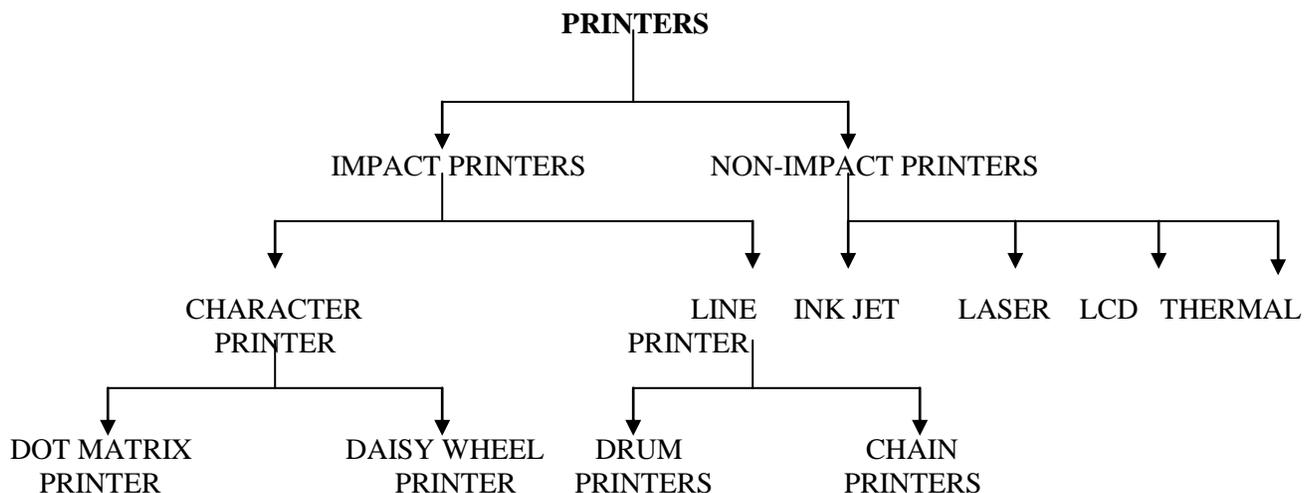
Resolution: Printer resolution (the sharpness) is usually measured in dots per inch (DPI). For sufficient resolution it is default set as 600 dpi for best (1200 dpi) for Econo mode (300 dpi) for top quality professional printing (2400 dpi)

Q9. Explain Printer and types of printer?

Ans: PRINTERS

Printers are the most commonly used output device. They provide hardcopy of information. Printers are available in low speed, high speed, colored and black and white. Number of colors can be increased by installing application software. Printers have built-in microprocessor to help control the printer-head movement across, up and down on the paper.

CLASSIFICATION CHART OF PRINTERS



TYPES OF PRINTERS

Printers are classified into two main categories:

- 1) Impact Printers
- 2) Non-Impact Printers

IMPACT PRINTERS

Most of the printing devices are impact printers. Impact printer works like a typewriter. They print by striking the ribbon against paper. Biggest advantage is that it can produce carbon copies 3 at a time. They are called noisy printers as they produce noise while printing. Impact printers are further divided into Character Printers and Line Printers.

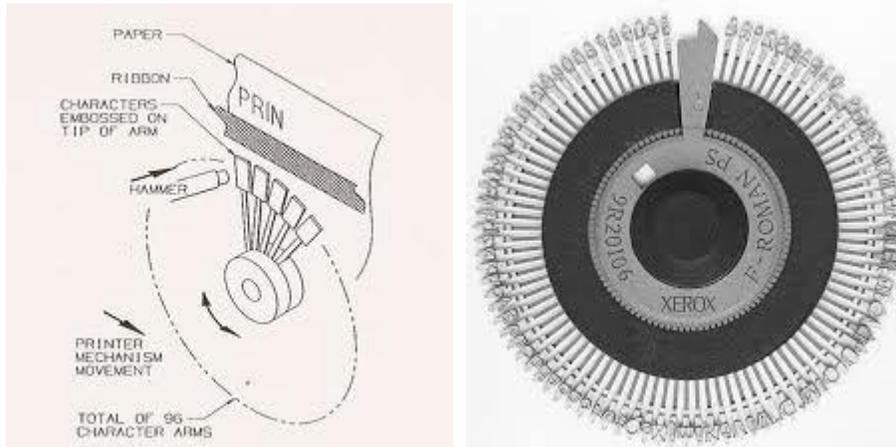
1) CHARACTER PRINTERS: Character printers are just like typewriters. They print one character at a time also called serial printers. They have only one printing head. Normally they can print upto 120 characters per sec.

EXAMPLES

A) DOT MATRIX PRINTER: The single head is used to print the entire line. It Prints one character at a time and moves on to the next character position. Characters are formed with the series of dots. Printer head consist of pins which strike the ribbon against paper to print characters. Typical matrix of 5 x 7 is used to make the pattern sometimes called 9 pins or 24 pins printers.

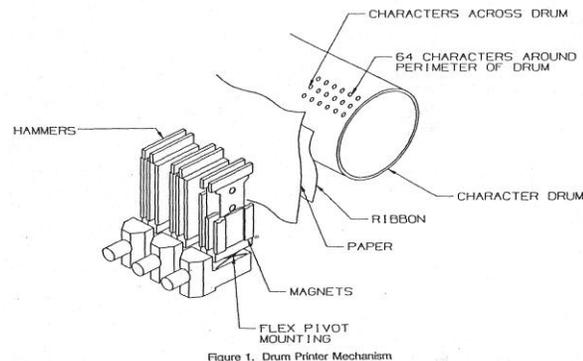
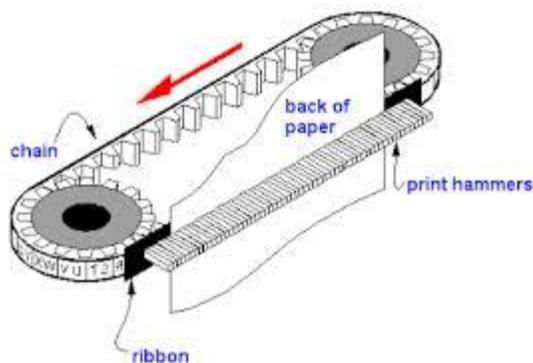


B) DAISY-WHEEL PRINTER: Similar to a ball-head typewriter, this type of printer has a plastic or metal wheel on which the shape of each character stands out in relief. A hammer presses the wheel against a ribbon which in turn makes an ink stain in the shape of the character on the paper. Daisy-wheel printer produces letter quality print but cannot print graphics.

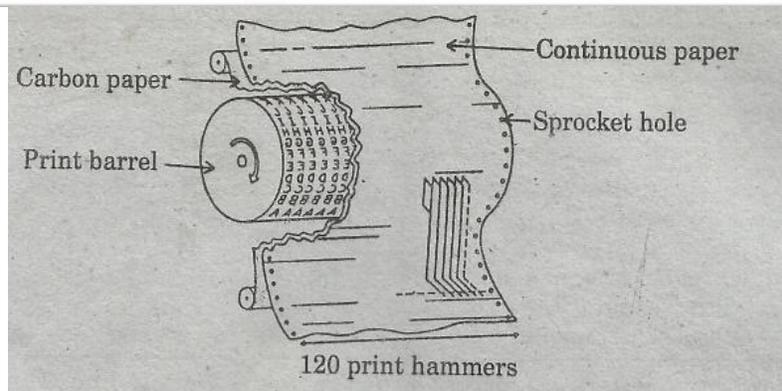


2) LINE PRINTERS: They can print entire line at a time. It normally covers 80 or 132 characters. That means printer has 80 or 132 heads to print each character. It can print 2500 lines per minute.

EXAMPLES: 1) Drum Printers 2) Chain Printers



A) DRUM PRINTERS: It consists of solid cylindrical steel drum having embossed characters in bands on its surface. Each band contains all the possible characters. At each printing position hammers are located which strike the paper along the inked ribbon on the drum as the characters pass. It prints 300 to 2000 lines per minute.



NON-IMPACT PRINTERS

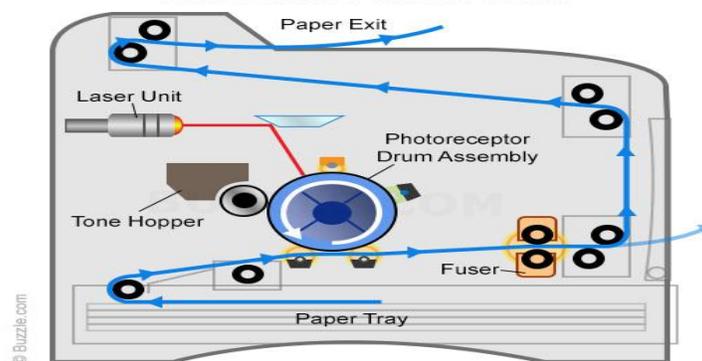
They use magnetic, electrostatic, chemical, thermal, optical, inkjet or laser principles to print characters on the paper. They get the image of the data and then transfer it to the paper, without striking the paper directly. It cannot produce carbon copies. It has to print the same data repeatedly to produce large number of copies. They are costly but quite printers.

EXAMPLES

1) **THERMAL PRINTERS:** Thermal action is used for printing. Ink is transferred to the paper as the wax melts when ribbon is heated. It is an inexpensive printer that works by pushing heated pins against heat sensitive paper. Thermal printers are widely used in calculators and fax machines. Speed is form 1-4 page per min (ppm). Uses are ATM machine receipts, Health care insurance cards, departmental store POS receipts. Coffee mugs printing, airline booking tickets

2) **LASER PRINTERS (Light Amplification by Stimulated Emission of Rays):** They use the technology of both normal printers and photocopier machine. Laser beam electrically charged the paper exposed to it. Exposed area attracts ink powder called toner, which prints on the paper permanently with heat or pressure. They are quite and produce high quality printouts.

How Laser Printers Work



INK-JET PRINTERS: Sprays ink on sheet of paper. Characters are formed by many tiny ink dots formed from ink droplets. These ink droplets are electrically charged guided by the electrically charged deflection plates to proper position on paper. Ink-jet printers produce high quality text and graphics.

LCD (Liquid Crystal Display) and LED (Light Emitting Diodes): Similar to Laser printer but uses liquid crystals or light emitting diodes rather than a laser beam to produce an image on the drum.

Q10. Explain Plotters and its types?

Ans: PLOTTERS

Plotter is a special kind of output device that prints graphics on papers, which includes large drawing, graphs, making large maps, plotting engineering designs and machine components. Plotters differs from printers in that they draw continuous lines using a pen, where as printers can only simulate lines by printing closely series of dots. Multicolor plotter use different colored pens to draw different colors. Plotters are more expensive than printers. They are used in architecture designing and engineering applications where precision is mandatory.

TYPES OF PLOTTERS

There are two types of plotters:

- 1) Pen Plotters
- 2) Electrostatic Plotters

1. PEN PLOTTERS: They are further divided into: 1) Drum Plotters 2) Flatbed Plotters

DRUM PLOTTERS: In drum plotters paper is placed over a drum that rotates back and forth to produce vertical motion. Its mechanism also consist holders horizontally across the drum. Computer moves the drum and pen simultaneously to draw, the graphics and designs. To produce colored output different colors of pens can be mounted in different holders. Example Rector Scale and ECG Report

FLATBED PLOTTERS: In flatbed plotters paper is fixed on a rectangular flatbed table and pens are moved to draw the image. Multicolored pens are used for colored plot. Plot size may be small as A4 or large as used in designing of Cars, Ships, Aircrafts, and Highways etc. That means large plot size can be upto 20 to 50 feet.

2. ELECTROSTATIC PLOTTERS: It produces a faster image by charging the paper with high voltage. This voltage attracts toner, and then melted on to the paper with heat. This type of plotter is fast but gives low quality plot as compared to pen plotters.

Q11. What are Dual purpose devices? Explain with examples.

Ans. DUAL PURPOSE DEVICES

Dual purpose devices means, devices which can be operated as an input as well as an output device. Such devices can enter the data into the system and can retrieve the data out of the system in form of softcopy.

DISK DRIVE

Disk drive is a peripheral device that reads or writes the disks (Hard disks, Floppy disks, etc) that store information. Disk drives are called “storage devices” because they store information on portable or permanent disks. The drive contains a motor to rotate the disk at a constant rate and one or more read /write heads, which positioned over the desired track. When the disk drive is used to read some data from a disk, it will fall in the category of input devices; while during writing data onto the disk, it will be considered as an output device.

CD WRITER

A CD writer is a device connected to the computer which can write on CD-RW and CD-R discs. CD-R discs may be written, erased and rewritten, while CD-R discs may be rewritten only once. CD-R drives

can also read CD-ROMs and play audio CDs. The CD writer is also called a CD-R drive (short for Compact Disk Recordable Drive).

DIGITAL CAMERA

Hand held portable dual purpose input/output device. Natural camera captures pictures on a special coated film while digital camera capture images electronically without the need of film. Stores the pictures in camera memory then user can store in on any other storage devices of computer. These images can be edited , printed or copied in a document.

Advantage of digital camera are making photographs is inexpensive , reduce cost, fast and no film processing is required, can store dozen of image in micro seconds can increase the capabilities and capacity.

Q10. Differentiate between impact and Non-impact printers?

Impact Printer		Non-Impact Printer
1.	Impact printers are termed as noisy printer because they produce noise during printing.	Non-impact printers are also called as quiet printers as they print quietly.
2.	A metal slug (head) strikes a carbon ribbon leaving a character on the paper.	They produce a printer image without striking the paper.
3.	Printing quality and speed of impact printer is not good.	Non-impact printers produce high quality output with rapid speed.
4.	Impact printers can produce carbon copies at a time	Non-impact printers cannot produce carbon copies at a time
5.	They are inexpensive but mostly slow	They are expensive but mostly fast

Q11. Define and differentiate Softcopy and Hard copy?

Ans: **SOFTCOPY:** A document displayed on the screen is called softcopy. It is in machine-readable form. Softcopy is intangible and temporary. Screen output is known as softcopy.

HARD COPY: A printer version of a document is called hard copy, produced by a printer on a paper. Hard copy is tangible and permanent.

HARD COPY		SOFT COPY
1.	The output produced by printer on a paper is called hard copy.	The output that is shown on monitor screen is called softcopy.
2.	In case of errors, one must have to re-print the hard copy.	In softcopy errors can be removed easily.
3.	Hard copy is tangible and permanent in nature and is useful when it needs to be distributed.	Softcopy is intangible and temporary in nature. It cannot be distributed.
4.	Hardcopy is produced by a printer or plotter	Softcopy is produced by Monitor or projector/screen
5.	Softcopy can be converted into multiple hardcopies by using printer/plotter	Hardcopy can be converted into single or multiple softcopy using Scanner.
6.	Hardcopy backup file is difficult to maintained	Softcopy backup file is easy to maintained

	need more space to keep the records	can be kept in multiple drives, CD/DVD OR on email/website etc in different formats
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Q12. What is the purpose of using Input and Output devices?

Ans: INPUT DEVICES

Input devices are used to provide information to a computer depending on the type and purpose of input information. Input devices receive information from the outside and convert it into a form (binary patterns) that is acceptable for the computer memory. Two types of input information are usually provided to computer data or set of instructions (program) that tell the computer what to do with the data. Input information required some input devices, usually data is provided from the input device and the set of instructions are loaded into the computer memory from storage media. Some of the most commonly used input devices are: **Examples:** Keyboard, Mouse, and Card Reader etc.

OUTPUT DEVICES

Physical equipment which translate the outcome of the computation and related activities carried out by CPU into human understandable format. Output devices provide communication between a computer and the user. These devices retrieve information from the computer memory; convert it into a human readable form or machine-readable form for future use by another machine. An output device can be used to display or print the intermediate or final result of computer processing. The use of these devices depends on the type and purpose of output. A variety of output devices are used with computer. Some common examples of output devices are:

Examples: Printer, Monitor, and Plotter.