

2. Input & Output Devices

Q.No.1. Write about Mouse as an input device.

Meaning: Mouse is generally used in GUI environment. Under GUI, a small graphic is used to identify each function or program, such as 'store', 'print', etc. When the cursor is placed on the required graphic, user presses a button on the top of the Mouse and such function is activated. This is an ideal ^(=perfect) input medium, where keyboard can't be used.

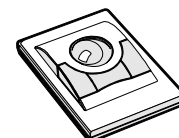
Types of mice:

- » A mouse may be classified as a mechanical mouse or an optical mouse.
- » A mechanical mouse consists of a small box, and a small ball bearing protrudes ^(=project out, Hang out) from the bottom of it. When the user rotates the mouse, this ball bearing rotates. The direction of rotation is detected by sensors inside the mouse and the signal is sent to the computer, through a cable. The signal is processed and the cursor moves on the display screen. Microsoft, IBM, Logitech, Samsung are some well-known manufacturers of mechanical mice.
- » On the other hand an optical mouse uses light beam to detect movement and it may use specially patterned ^(=designed) mouse pad. (of course today's optical mice do not need this).

Number of buttons: A mouse may have one, two or three buttons. The function of each button is determined by the program that uses the mouse. In most of the cases a mouse will have 2 buttons.

Q.No.2. Write about Trackball.

- » A trackball is a pointing device that works like an upside-down mouse. This is an alternative to mouse.
- » The user rests ^(=places) his thumb directly on the ball and his fingers on the buttons. To move cursor around the screen, the ball is rotated with the thumb.
- » Since the whole device is not moved, a track ball requires less space than a mouse. When space is limited, a track ball is very advantageous.
- » That is why track balls are mostly used in mobile computing devices like notebook computers.



Q.No.3. Write about Joystick. (N96-1M)

- » A joystick is a screen pointing input device. It consists of a vertical lever usually placed in a ball socket.
- » It can be moved in any direction to control cursor movements for computer games and for some professional applications.

Q.No.4. Write about touch screens. (RTP)

Introduction:

- » There are several pointing devices, to help users in selecting one among several options. One such input device is a touch screen.
- » It allows users to select one among several options, by touching the screen, either with finger or with another device (like stylus). Now the touch screen can sense the option being selected by the user. Touch Screen was invented by Hewlett Packard.
- » It is a user friendly device & it is very much preferred by nowise users.

Popular Technologies:

- » Two popular technologies exist for touch screens.
- » In one technology, the screen is made sensitive to touch and the exact position is detected.
- » In other technology, the screen is lined with light emitting devices ^(=light releasing devices) on one side and photo-detectors on the other. When the user touches the screen, the light beam is broken and is detected by photo-detectors.

Q.No.5. Write about Light pen as an input device. (RTP)

Meaning: A light pen is a touch input device. It is a pointing device which can be used to select an option by simply pointing at it. It can also be used to draw figures directly on the screen.

How it works? A light pen has a photo-detector at its tip. This detector can detect changes in brightness of the screen. When the pen is pointed at a particular point on the screen, it records the instant change in brightness and informs the computer about this. With this, the computer can find out the exact spot that the user is pointing on the screen.

Where it is used?

- a. **Pointing device:** Light-pens are useful for menu-based applications. Instead of moving the mouse or using a keyboard, user can select an option by pointing at it.
- b. **CAD:** It is also useful for drawing graphics in CAD. With the help of light pen, an engineer, architect or a fashion designer can draw directly on the screen.

Q.No.6. Write about display devices. What are the important features of display devices?

Meaning: Everyone who uses a computer uses some type of display device also. It consists of a television like viewing screen, to which computer output is sent. The 2 most common types of display devices found today are monitors and terminals. Monitors are the most commonly found display devices in microcomputer systems. A monitor is just a box with a viewing screen. A monitor can show both input and output.

Features of display screens: Hundreds of varieties of display devices are now available in market. Following are the important features of various display devices:

a. Screen Resolution:

- » One of the most important features is the clarity or resolution of the screen.
- » Most display devices form images from tiny dots - called pixels (also known as picture cells). More number of dots means more sharper the image.
- » Images are formed on monitor's screen by a card called display adaptor card.

b. Text & Graphics:

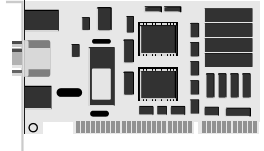
- » Many display devices can produce both text and graphics output.
- » Text output entirely consists of alphabetic characters, digits and special characters. Graphics output include images such as drawings, charts, photographs, maps, etc.
- » The most important business-related use of graphics is presentation graphics. Presentation graphics can easily convert the information into bar charts, pie charts, line charts etc.
- » Graphics display devices are also used in engineering and scientific applications. Display devices used for these applications are very sophisticated and expensive.

Q.No.7. What is meant by Video Controller? What are the popular video controllers that are being used in Personal Computers?**Video Controller:**

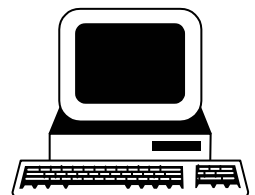
- » A video controller acts as an intermediary device between the CPU and the monitor.
- » It contains video-dedicated memory (Video RAM) & other circuitry necessary to send information to the monitor. Most of the video controllers include at least 2 MB of video RAM or VRAM. (This is in addition to the RAM connected to the CPU.)
- » There will be a microprocessor on the video controller and the speed of the microprocessor determines the quality of picture.
- » It is just a circuit board and is usually called as a card ("video card" or "video controller") and is attached to the computer's motherboard.
- » The quality of video controller is determined by refresh rate, resolution & number of colors that can be displayed.

Popular display adaptors:

- a. **MGA:** MGA or Monochrome Graphics Adapter is one of the first adapters. It is a text-only adapter which generates very clear, easy-to-read characters. It works only with monochrome monitor.
- b. **CGA:** CGA or Colour Graphics Adapter can display both text and graphics. It can support both colour and monochrome monitors with various resolutions. A CGA adapter provides following two combinations of resolutions:
 - » 640 x 200 pixels with 16 colours or
 - » 320 x 200 pixels with 4 palettes.
 Each of these palettes has 4 different colours. Only one palette can be used at a given time.
- c. **EGA:** Enhanced Graphics Adapter combines all the features of MGA & CGA with higher resolutions. It supports upto 16 colours at a time. EGA usually has a high resolution of either 640 x 200 pixels or 640 x 350 pixels.
- d. **VGA:** VGA or Video Graphics Adapter is a high quality graphics adapter which provides upto 256 colours and also high resolution. VGA can provide following 2 combinations of resolutions:
 - » 640 x 480 pixels with 16 colours.
 - » 320 x 200 pixels with 256 colours.
- e. **SVGA (N08-1M):** SVGA or Super Video Graphics Adapter is an improvement on VGA. The two combinations of resolutions and colours provided by SVGA are:
 - » 640 x 480 pixels with 256 colours.
 - » 1024 x 480 pixels with 16 colours.

**Q.No.8. Computer Terminals and its types. (RTP)****Computer terminal:**

- » It is also known as Video Display Terminal (VDT) and generally combines input & output functions.
- » It consists of a QWERTY keyboard for entering data into the computer. It also comes with a printer or TV screen for displaying information from the computer.
- » Terminals are generally used to communicate with remote computers through communication lines.
- » For e.g. Airline reservation agents use these terminals.
- » Tellers in banks and cashiers in many retail stores also use terminals to perform their duties.

**Types of Terminals:**

- a. **Dumb Terminal (N07-1M):** It is an input/output (I/O) device that provides for data entry and information exit. It can't process data by itself. Generally it is connected to a central computer, which does the actual processing job. Advantage is that it is very cheap. Disadvantage – If the central computer fails, these terminals can't work.
- b. **Intelligent Terminal: (N02-1M)**
 - » It is a type of terminal which consists of some storage space and also a microprocessor.
 - » Thus it can process data by itself and does not rely on central computer for processing. This type of terminals can reduce work load on the central CPU.
 - » Thus, intelligent terminals can be used on stand-alone basis or can be connected to central computer.
 - » It is also user-programmable (i.e. user can change the program inside the terminal).
 - » They also provide back up to the main computer because they can handle some processing work.
- c. **Smart Terminal (RTP):**
 - » These terminals also consist of a microprocessor and some internal storage.
 - » They have data editing capability and can consolidate input data before sending it to CPU. The major difference between intelligent terminals and smart terminals is that smart terminals are not user programmable (i.e. user can't change the program inside the computer).

d. Keyboard printer terminal (Teletypewriter):

- » Keyboard printer terminal or teletypewriter consists of a keyboard and printer. Keyboard is used to input data to the computer and a printer is used to take a copy of the data (input) or information (output).
- » Output is normally typed on a continuous role of paper at the speed of 20 to 50 CPS.
- » If the information is to be retained for subsequent purposes, a paper tape reader/punch is included in the design of the terminal.
- » In place of paper tape reader/punch, some recently designed machines are using magnetic tape cassettes for the same purpose.

e. Remote Job Entry / Terminal:

- » Remote job terminal groups data into blocks for transmission to a computer from a remote site.
- » Some RJE terminals have the capability of receiving back and printing the results of the application program.
- » Such a unit is itself a small computer, which can be used either as job entry terminal or as a stand alone computer.
- » A terminal may be situated at the computer site or at a remote place where data is more readily available.
- » Terminals linked to the computer system by a direct cable are known as hard-wired terminals. However, for remote terminals, communication to the main system can be established via telecommunication lines.

Note: Dumb Vs. Intelligent terminal – M96-5M, N99-5M, N05-4M

Remote job entry Vs. Direct data entry – N97-5M, RTP

Q.No.9. What is meant by DDE? What are the approaches & devices available for DDE?

- » DDE refers to entry of data directly into computers through machine readable source documents.
- » DDE does not require manual transcription of data from original paper documents.
- » DDE devices can scan source documents magnetically or optically to capture data for direct entry into the computer.
- » Magnetic Ink Character Readers and Optical Character Readers are examples of such devices.

Q.No.10. Write about MICR [Magnetic Ink Character Recognition]. (M08-1M, M02-5M, RTP)

Introduction: This method is useful for direct data entry. Here a machine recognizes magnetically charged characters that are printed on source documents. These systems are typically found in banks (used for processing cheques). MICR readers detect the characters and convert them into digital data.

Features:

- » It employs ^(=uses) a system of printed characters, which can be read by human beings as well as machines.
- » It uses a special printing font ^(=style of characters) to represent characters.
- » In this font each character is composed of vertical bars.
- » Characters are printed using special ink that consists of magnetisable material.



Character 2 in MICR

How it reads?

- » In this system, the data to be read is passed through a reading head.
- » Small and big gaps in the character will send different signals to the computer (represented by bit 1 and 0 bit).

Where it is used?

- » This method is primarily used in banking industry and most of the cheques are now processed under MICR approach.
- » Data about bank identification number, customer's bank account number are directly printed on the cheque, by a printing press. Cheques are then handed over to the customer.

Advantages:

- » High reading accuracy. Even if cheques are smeared, stamped, roughly handled, they can be accurately read.
- » No transcription of data.
- » Cheques can be read both by human beings and machines.

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Disadvantages:

- » The system is very costly. (That is why only few businesses accepted it and used it.)
- » If the documents are damaged or if the cheques are not encoded with amount etc. then such documents should be processed clerically.

Q.No.11. OCR. (N05-5M, RTP)

Introduction: Optical Character Recognition is a system in which printed characters are recognised by machines.

How it works?:

- » This method employs a set of special characters, understandable to human beings and machines.
- » Reading is done by light scanning techniques in which each character is illuminated ^(=light up) by a light source and reflected image is analysed.
- » OCR can read the characters printed by computer printers, cash registers, adding machines and typewriters.
- » Some readers can also read hand-written documents. The diagram shows some handwritten characters that can be read by OCR.

ABCDEFGHIJKLMN
 OPQRSTUVWXYZ
 1234567890

Characters to be used in OCR

RULE	CORRECT	INCORRECT
WRITE BIG	02834	o2834
CLOSE LOOPS	06889	o6889
USE SIMPLE		
SHAPES	02375	o23375
CONNECT LINES	45T	45T
BLOCK PRINT	CSTXZ	CSX7Z

Principles for Handwriting in OCR

Where is it used?

- » Very much suitable in the area of large volume billing applications.
- » The customer paying the bill gives the bill, which consists of some OCR data (e.g. customer number, amount of bill, etc.). Thus, the bill (or the part returned by the customer) becomes input for recording cash receipts from the customer.
- » This system can minimise or eliminate the keying process, when cash receipts are in huge size.

Advantages:

- » Eliminates transcription of data through keyboard.
- » No paper work explosion (i.e. reduces paper work).
- » Even less skilled staff can operate the system.
- » Much cheaper than other direct data entry devices.
- » It can also read handwritten data.

Limitations of OCR:

- Rigid input requirements:** The requirements of font type and size are very specific. In typing there are chances for strike-overs, uneven spacing and erasures. OCR may face difficulty in reading such documents. Form design, ink specifications, paper quality, etc. become critical. Therefore, they should be standardized.
- Not economical:** Optical readers are economically feasible ^(=practicable) only when the daily volume of transactions is high.

Q.No.12. OMR.**Where is it used?**

- » This technique is commonly used for scoring tests.
- » It is suitable in the areas where the person is required to choose one among different options.

- » The document is marked by the person taking the tests.
- » OMR is used in several applications such as order writing, payroll, inventory control, insurance, questionnaires, etc.

How it works?

- » The document is passed through an optical mark page reader.
- » Now page reader will read the printed marks by absorbing light emitted ^(=released) on the document.
- » Reflected light is converted into electric impulses and are sent to recognition logic circuit.
- » Then they are compared with previously programmed characters.
- » If it is valid, a signal is sent to the CPU for recording.
- » If suitable comparison is not possible, document is rejected.

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Speed: OMR can read upto 2,000 documents per hour.

Special Requirements: Designing the document for OMR is a very tough task. They should be simple to understand. Otherwise more errors would occur than in traditional methods.

Advantages & Disadvantages: Similar to OCR.

Q.No.13. Smart Card Systems. (M06-5M, N08-1M)

Smart cards resemble ^(=look like) credit cards in size and shape. However, they contain a microprocessor chip and memory and some may include a keypad also. These were first developed in France and many organizations are still experimenting with them.

Where they are used?

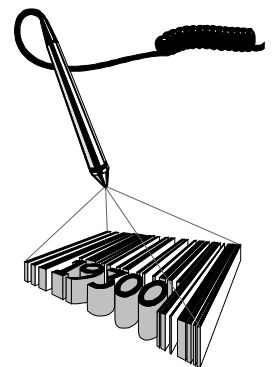
- » These are frequently used to make electronic purchases and to transfer funds between accounts electronically.
- » However, the potential ^(=possible) applications for these systems are very large in number. In many cases, smart cards can provide new or better services to customers.
- » For example, in health care industry smart cards are used to store the holder's identity, address, insurance data, relatives' details, allergies and even a brief medical history. If the cardholder meets an accident or illness, the card could be immediately used to assist with treatment.
- » Smart cards can also be used for security applications.

Q.No.14. Write about bar code reader. (N03-5M, N06-4M, RTP)

Bar code & Bar code Reader: Bar code is a machine readable code consisting of vertical bars of different widths which are used to represent data. It uses vertical printed lines that can be converted into binary numbers. All such conversion is done by a bar code reader. It is a photoelectric scanner that reads bar codes by means of reflecting light.

How it works?

- » Bar code reader emits a beam of light on the bar code image (generally a laser beam). A light-sensitive detector identifies the reflected bar code image. Now it converts the individual bar codes into numeric digits.
- » The special bars at each end of the image are different. So the reader can easily recognise whether the barcode is correctly read or not.
- » Now the bar code reader directly feeds that number to the computer, just as a number is typed on a keyboard.
- » Thus bar code reader is used to convert bar code into product number or some other useful information.



Advantages:

- » Improves the accuracy of data entry.
- » Better customer service through faster checkout at the point of sale and
- » Greater control and reliability of inventory records.

Where it is used?

- » These are commonly found in supermarkets and departmental stores.
- » They are used in industries and organizations that must count and track inventory, such as medical stores, libraries, military and other government organisations, transportation facilities and automobile industry.

Q.No.15. Image Scanners.

Meaning: A scanner is a peripheral device that converts a printed image into digital form that can be read by the computer. Thus it is used to digitize a document/image.

Need: In some situations it is necessary to input some printed image to a computer. The simplest way is to take a photo of the image, directly from the source and convert it into a form that can be understood by the computer (i.e. 0's and 1's). Now, this image can be saved on disk and then printed i.e. digitizing the document.

How it works?

- » A scanner scans an image and transforms ^(=converts) the image to ASCII codes i.e. the code used by computers to represent characters and images.
- » After scanning, the user can edit, manipulate and print the scanned document.

Types of Scanners:**a. Flat bed Scanner:**

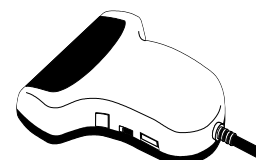
- » It is similar to a Photocopier machine.
- » To use this scanner, one has to place the printed image on a piece of glass, similar to the way a page is placed on a photocopier machine.

b. Roller feed Scanner:

- » Here the image is passed over a roller, where it is captured.
- » But this can scan documents only. It can't scan images from books. If it is necessary, we have to separate the pages.

c. Hand held Scanners:

- » These are less expensive scanners.
- » To use this scanner, one has to roll the scanner across the image.
- » If the image is wider than scanner, one has to make multiple passes.
- » The only difficulty is that it requires multiple passes over a single page.
- » However, these scanners are portable.



Some Manufacturers: HP, UMAX, MICROTEK, MODI XEROX, etc.

Q.No.16. Briefly describe the procedure of document imaging. What are the advantages of document imaging.

Meaning: In this system, an image is captured and stored in electronic form so that it can be stored and shared. It can capture anything, including type written documents or handwritten documents (such as invoices or tax returns), flowcharts, drawings, photographs, etc. Many companies that use document imaging are moving towards paperless offices.

Steps in Document imaging: (N04, M07-5M)

- a. Data capture:** The most common method of converting paper documents into electronic form is to scan them. A scanner can convert text and pictures into electronic codes. It can range from a simple hand held scanner to a high-end, high-speed scanner which can scan more than 2,500 pages per hour.
- b. Indexing:** Document images must be stored in such a way that it facilitates retrieval ^(=recover). Therefore important document information such as purchase order numbers or vendor numbers are stored in the form of index.
- c. Storage:** Generally images occupy huge memory space. So, they are usually stored on optical disks. One 5.25" optical disc can store upto 1.4 GB of data or about 25,000 documents.

- d. **Retrieval:** If the information stored in the Index is keyed in, the required document can be retrieved. The index can tell the optical disc to be searched and the requested document can be retrieved quickly.
- e. **Output:** The requested document is produced on the computer's monitor or on paper or can be transmitted to another computer.

Advantages: It is estimated that 90% of the work of accountants and others is linked with paper. It is also estimated that the volume of information required by companies doubles in every three or four years. As a result, big corporate companies will be buried by paper. The best solution to this problem is to use document imaging. Following are its advantages:

- a. **Accessibility:** Documents can be accessed and reviewed simultaneously by many people, even from remote locations.
- b. **Accuracy:** Accuracy is very high because there is no need to enter data manually.
- c. **Availability:** There are no chances of losing or misfiling documents. Even after years, documents will be available for use.
- d. **Capacity:** Huge amount of data can be stored in very little space, which significantly reduces storage and office space.
- e. **Cost:** When huge amount of data is stored and processed, cost per document will decline. As a result, cost of other functions like input, file, retrieve, refilling of documents also declines.
- f. **Security:** Passwords can be allotted at various levels, so as to restrict document access.
- g. **Speed:** Data can be retrieved at fantastic speeds.
- h. **Versatility** ^(=flexibility): Handwritten or typed text can also be stored as an image. These documents can also be used in other computer applications.

Q.No.17. Write about different forms of computer output and computer output devices?

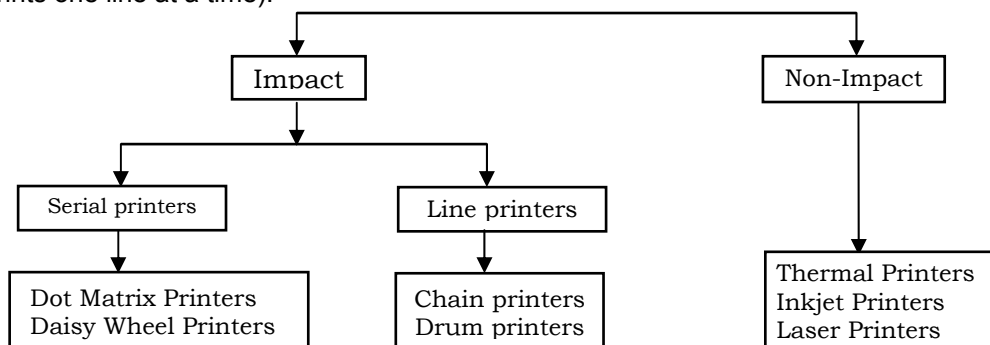
Meaning: Output is the result of processing of input. There may be different forms of input such as text, graphics, sound etc. So, correspondingly there will be different forms of output. Following table shows the commonly found forms of output and output devices.

<i>Form of output</i>	<i>Output devices used</i>
Soft copy output	Visual Display Unit or Monitor
Hard copy output	Printers, Plotters, COM
Sound output	Speakers

Printer: Printer is the most commonly used output device. It provides a permanent visual record of the output. Different types of printers are available in the market. They can be classified as under:

- i. **Impact Printers:** These printers use some form of striking device ^(=hitting device) to transfer ink from an inked ribbon on to the paper. Characters are formed by any one of the following methods:
- A complete image of each character is printed (Also known as character printers),
 - They are formed by dot matrix method, which arrange a series of dots, to get the shape of each character.

Impact printers are again sub-divided into - Serial printers (Prints one character at a time) and Line printers (Prints one line at a time).



- II. **Non - Impact printers: (M01-1M)** In this type of printers there will be no direct contact between paper and the print head. These printers form characters by chemical or electronic means ^(=ways). The most commonly used non impact printers are Thermal Printers, Laser Printers and Ink jet printers.

Computer Output Microfilm (COM):

- » It is an output technique that records output from a computer as microscopic images on roll or sheet film. The output is miniaturized (i.e. reduction of size) and stored on microfilm or microfiche (a sheet of photographic film). This entire job is done by a small camera.
- » This technique is used when output is very huge in size and required to be stored for a very long period of time. (May be decades).

Voice output:

- » This form of output is becoming most common today. Voice output is produced in two ways.
- » In the first method the computer will play stored words over a speaker.
- » In second method, the voice is created with special computer circuitry and this process is called Speech synthesis (Also known as Voice Synthesizers). This circuitry is designed in such a way that it can produce sounds like human voice.

Punched and magnetically encoded output: Most of the early computers used punched cards for output. But nowadays this type of input or output is very rare. They are replaced by much more flexible and faster magnetic media. Under magnetic media, output will be stored in the form of magnetic codes on devices such as floppy disks, magnetic tapes etc.

Graph plotter: A graph plotter is a device used to trace out graphs, designs and maps onto paper and even onto plastic or metal plates. They provide high degree of accuracy, even up to one thousandth of an inch. There are two kinds of plotters: Flat bed Plotters and Drum Plotters.

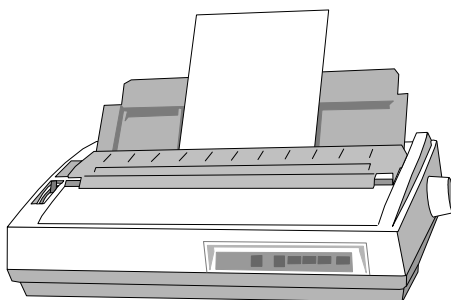
Visual Display: The most widely used output device is a screen on which characters are displayed. To display a character, the computer sends an electronic signal to the screen. The signal is decoded to display corresponding character on the screen. The most common type of screen is CRT. CRT consists of a picture tube similar to a television. To overcome the problem of bulk CRT, flat panel screens are being used. These screens are thin and light weight. They are generally used in portable devices.

Note: Impact Vs. Non impact printers. (N97-5M, M04-4M, RTP)

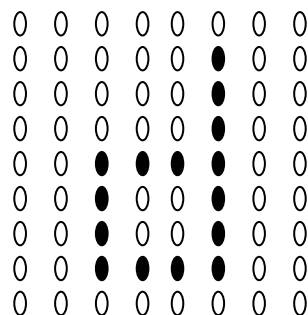
Q.No.18. Write about Dot Matrix Printers.

Introduction:

- » It is a kind of impact, serial printer (i.e. prints one character at a time.)
- » The first Dot Matrix Printer was developed during 1970's.
- » These are small in size but offer very high speed printing.
- » It can print a wide range of outputs like text, images, graphs etc. This is due to their unique method of character generation.



Dot Matrix Printer



Formation of Letter 'd'

Print mechanism:

- » The printing head is a matrix block which consists of rows and columns of holes through which pins (or wire needles) appear. The required character is formed by activating the printing head so that certain pins appear through the holes. Now the printing head is pressed against an inked ribbon and printed on paper. The inked ribbon is similar to traditional typewriter ribbon.
- » The matrix of pins can change from printer to printer, depending on the print quality required. Some printers have a matrix of 11X9 pins and some may have a matrix of 23X18 pins. The greater the number of dots, better will be the quality. For example, following figure shows the formation of character 'd'.

Popular Manufacturers: TVS Electronics, Wipro, IBM, Hewlett Packard, Brother, General Electric, CANON, EPSON, STAR etc.

Advantages:

- » Ordinary paper and stationery can be used i.e. no special paper required.
- » Can print carbon copies.
- » High speed of Printing.
- » Less Maintenance cost.
- » This can also print in colour (by changing the ribbon from black to required colour).
- » Can print documents with different font sizes & shapes.
- » Can print text, images, graphs, etc. (Of course the quality is poor)

Disadvantages:

- » Makes noise.
- » Useful for printing documents which are retained in the organisation only.
- » Can't provide different colours of printing at a time.
- » Can't print full character (character is formed with matrix of dots.)
- » Useful for printing text only i.e. not suitable for printing high quality images, graphs etc.

Suitability: The printing quality of these printers is very poor (Draft quality). They are suitable for printing documents, which are usually retained ^(=kept) within the organisation

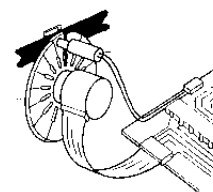
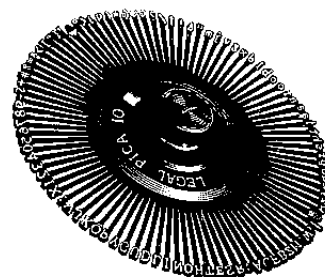
Q.No.19. Daisy Wheel Printers.**Introduction:**

- » This is just similar to an electronic typewriter. The major difference is that they use a new type of printing element called 'daisywheel'.
- » Daisy wheel is a moulded metal or plastic disc-shaped printing element. It is about 65 mm in diameter and has number of stalks or petals which radiate ^(=spread out) from the central core. At the end of each stalk, a character is engraved ^(=imprinted, fixed, carved). (Similar to a typewriter.)

Print Mechanism:

- » It works by rotating the print element until the required character is reached.
- » Now a small hammer hits the back of the stalk. The character is then forced against inked ribbon onto the paper.
- » All this happens at a speed of 10 to 80 cps (faster than a typist).

Popular Manufacturers: BROTHER, DATA POINT, FUJITSU, OLYMPIA, etc.



Advantages:

- » Ordinary paper stationery can be used i.e. no special paper required.
- » This can also print in colour (by changing the ribbon to required colour).
- » Can print carbon copies.
- » High speed Printing.
- » Low Maintenance cost.
- » Can print full character.
- » Sharp Printing.

Disadvantages:

- » Makes noise.
- » Can't print documents with different colours and font sizes.
- » Not suitable for printing graphs, images etc. Useful for printing text only.
- » Useful for Internal Documents only.

Suitability: The printing quality of these printers is better than Dot Matrix Printers. But these are not capable of printing documents with different font sizes and colours. So, they are suitable for internal documents only.

Q.No.20. Chain printer.**Print Mechanism:**

- a. It's a kind of impact, line printer. (Prints one line at a time).
- b. The print element consists of a chain that revolves horizontally at a constant speed. The complete chain consists of a set of 48 numbers, alphabets, special symbols and they will be repeated 5 times over the chain.
 - » It consists of as many hammers as the number of print positions (80 / 132 / 160).
 - » These hammers are controlled magnetically.
- c. Paper and ribbon are placed in between chain and hammers. When a required character on the chain faces its print position, the corresponding hammer is activated. The chain revolves so quickly that it appears as if the entire line is printed at a time.

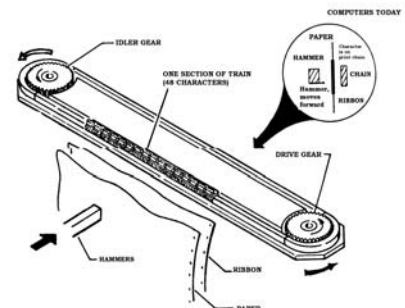
Advantages:

- » Prints at a very high speed (One line at a time).
- » Prints full character (Character Printer).
- » Allows Carbon copies.
- » Low cost of printing and stationery.
- » Sharp printing.
- » Low maintenance cost.

Disadvantages:

- » Can't print a document with different colours and font sizes.
- » Makes noise.
- » Useful for printing text only.
- » Useful for Internal documents only.

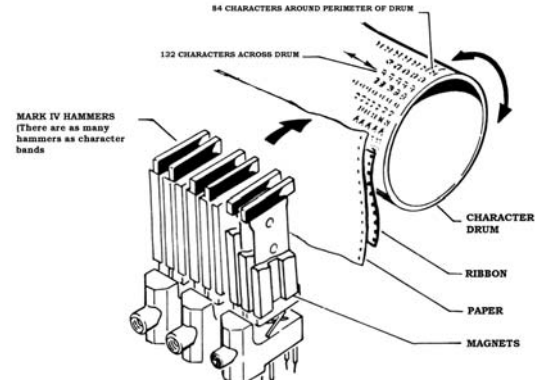
Suitability: The printing quality of these printers is better than Dot Matrix Printers. But these are not capable of printing documents with different font sizes and colours. So, they are suitable for internal documents only.



Chain Printer (Schematic View)

Q.No.21. Drum printers.**Print Mechanism:**

- » It is a kind of impact, line printer.
- » These printers use solid cylinder as drum which rotates at a constant speed.
- » There are as many bands on the drum as the number of print positions. Each band consists of a set of 48 numbers, alphabets & special characters.
- » The printer consists of as many no. of hammers as the number of print positions (80 / 132 / 160).
- » The inked ribbon and stationery are placed in between hammers and drum.
- » In one rotation of drum there would be appropriate strikes by the set of hammers.
- » In the first strike all A's are printed in appropriate positions followed by B,C,D... and so on.

**Drum Printer (Schematic)**

Advantages & Disadvantages: - Similar to Chain Printers.

Suitability: The printing quality of these printers is better than Dot Matrix Printers. But these are not capable of printing documents with different font sizes and colours. So, they are suitable for internal documents only.

Note: Serial printer Vs. Line printer. (N94-6M)

Q.No.22. Thermal Printers.**Print Mechanism:**

- » Thermal printers use heat to produce an image on special paper. The print mechanism is similar to that of a Dot Matrix Printer.
- » The printing element is similar to that of a Dot Matrix Printer i.e. it consists of a matrix of holes through which pins appear. The printer forms each character on the matrix printing head in the normal way. Now pins are heated by an electric element and then pressed against a special paper (Wax coated paper).
- » When pins touch the paper, the area heated by pins will change colour (usually to black or brown).
- » Thus the image is burned onto the paper.
- » This technology is widely used in Fax machines.

Advantages:

- » Primarily used for graphics and handouts.
- » Can print documents with different colours at a time.
- » Can print documents with different font sizes and shapes.
- » Sharp printing.

Disadvantages:

- » Special and expensive paper required.
- » Less sharp or clear.
- » Difficult to copy on office machines.
- » Makes noise.
- » Not suitable if the documents are to be retained for a long period of time.

Q.No.23. Ink Jet Printer.**Introduction:**

- » They were developed earlier to 1990 but became popular only after 1990. When they first appeared, ink jet printers were very expensive but now varieties of inkjet printers are available in the market at reasonable prices.
- » This is the cheapest way of getting high quality printing.

Print Mechanism:

- » Inkjet printers consist of a matrix of nozzles. To print a character, ink is sprayed through these nozzles. The ink so sprayed is controlled through magnets.
- » One can print on regular paper. But better results can be obtained by using special coated paper.

Popular Manufactures: Epson, Canon, Lexmark, Modi Xerox, HP, Fujitsu.

Types of Inkjet Printers:**a. Liquid Inkjets:**

- » Liquid inkjet printers use ink cartridges from which they spray ink onto the paper. The print head consists of 50 or more nozzles, each nozzle thinner than human hair. The number of nozzles determines the print quality. A digital signal from the computer tells each nozzle when to spray a drop of ink onto the paper.
- » Colour inkjet printers use three separate tanks of ink, one for each of the primary colours. (Magenta, Yellow, Cyan)

b. Solid Inkjets:

- » Solid inkjet printers use solid ink sticks that are melted into a reservoir & sprayed onto paper.
- » High pressure rollers are used to flatten and fuse (=stick) ink onto paper.
- » This produces an exceptionally high quality image with sharp edges & good colour reproduction. These printers are called phase change printers.
- » As a final step, the paper moves between two rollers to cold fuse the image and improve the quality of output.

Advantages:

- » Can print full character.
- » High Speed of printing.
- » No noise (almost nil).
- » Can print documents with different colours and font sizes.
- » Cheapest mode of getting multi colour printing.
- » Sharp printing. (of course with high resolution printers only)

Disadvantages:

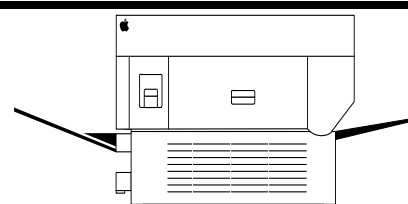
- » Requires special kind of stationery or paper. (For better quality of output.)
- » Printing cost per page is more than that of impact printers.
- » Not useful for printing documents that are required to be stored for a long period of time.
- » Doesn't allow carbon copies.

Suitability: This is the cheapest way of getting multi colour printing. Today the technology is so improved that high quality photographs can also be printed from these printers. On the other hand Solid inkjets are best suited in cold regions.

Q.No.24. Laser printer.

Introduction: This is one of the most commonly used non impact printer. The technology is similar to that of a xerographic copier machine. A laser printer is a page printer.

- » These printers combine the technologies of Laser and Xerographic machines.



Laser Printer (Outer View)

- » Laser is the heart of these printers. A separate CPU is built into the printer to interpret the data and to control the Laser beam.
- » Laser printers can print alphanumeric characters, high quality images, graphs, etc.
- » The quality of output depends upon resolution and it is expressed in Dots Per Inch.
- » The dots in an image are very close to each other and look like full characters.
- » Its speed can be anywhere between 4 to 17 PPM (Even faster printers are available in the market).

Manufacturers: Laser Jet by HP, Canon, Xerox, Wipro, Lexmark, Samsung etc.

Advantages:

- » Very high speed printing.
- » Makes very low noise.
- » Low maintenance cost.
- » Very high quality of images can be printed.
- » Can print documents with different colours and different font sizes (of course, it is very costly).
- » Can print full character (Letter quality printing).
- » Long shelf life.

Disadvantages:

- » Printing cost per page is more than that of impact printers.
- » Doesn't allow carbon copies.
- » High cost of multi colour printing.

Note: Discuss different Non - impact printers that are in use. (M01-3M)

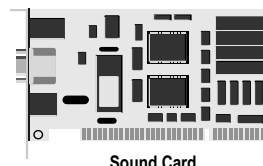
Q.No.25. Write about Microphones and voice recognition.

Now, sound has become a very standard part of computers. Microphones are used as audio input devices and speakers are used as audio output devices. Sound is used in multimedia, where the quality of presentation can be improved through animation, music or sound effects. Microphones and speakers are analog devices and computer is a digital device. Sound card acts as a translator between these devices. A sound card can translate analog signals into digital signals and vice versa.

Voice Recognition: Today there is a wide demand for systems which can translate spoken words into text. Such capability is called **voice recognition** (or speech recognition). With the help of this facility one can directly speak to the computer and need not type the data. The user can also control the computer with oral commands, such as "shut down", "print", "Close" etc. Major challenge for this software is that certain words can have 2 different meanings (e.g. "two" versus "to"). That is why translation is becoming very difficult. Another challenge is to separate meaningful sounds from background noise.

Sound Output: Just as microphones are important input devices, speakers are important output devices. Today a multimedia PC comes with a CD-ROM drive, high-quality video card, speakers and a sound card.

Sound Card: The most complicated part of the sound output system is sound card. The sound card translates digital sounds into electric current (analog signal) which is sent to the speakers. On the other hand it converts analog signal (from microphone) into digital signal and records it as a number. When the sound is played back, the sound card reverses this process i.e. translates numbers into electric current.



Q.No.26. Computer Output Microfilm. (N01, N04-5M, M08, N08-1M)

Introduction:

- a. It is an output technique that records output from a computer as microscopic images on roll or sheet film. The images stored on COM are similar to images printed on paper. This recording process reduces the size of characters by 24, 42 or 48 times smaller than its original size. The information is then recorded on sheet film called 16 mm/35 mm microfilm or 105 mm microfiche.
- b. COM devices are mainly used with mainframe computers and are operated by computer professionals.

Print Mechanism:

- » The data to be recorded on microfilm can come directly from the computer.
- » The data is read into recorder, where it is internally displayed on CRT.
- » As it is displayed on CRT, a Camera takes a picture and places it on the film.
- » Then the film is processed, either in recorder or separately. After processing it can be retrieved ^(=get back, recover) and viewed by the user.

Advantages:

- a. **Speed:** Data can be recorded on the film at a speed of 30,000 lpm ^(=Lines Per Minute).
- b. **Cost is very less:** Cost per page of printed material is less than that of regular hard copy output methods.
- c. **Less space:** The output is condensed ^(=reduced) by 20 to 100 times (when compared to hardcopy output).
- d. **How to read:** Variety of readers is available in the market that can provide ready reference to data.

Micro film Vs. Micro fiche (RTP): Both are created on a negative film and one can make as many copies as he likes. However, there are certain basic differences between them as explained below:

- a. **Physical difference:** Microfilm is in continuous form while microfiche is cut into pieces.
- b. **Access:** Microfilm can provide sequential access whereas microfiche can provide direct access.
- c. **Capacity:** A microfilm is 16 mm or 35 mm roll of film. Each roll can hold 2,000 to 5,000 pages of information. On the other hand microfiche is 105 mm film cut into 4"X6" sheet and each sheet is capable of storing upto 270 pages of information.

Q.No.27. Graph Plotter. (N98, N05-1M, RTP)

Introduction: A plotter is a specialised output device designed to produce high quality graphics in a variety of colours. Sometimes we need high quality visuals which can not be obtained through printer. A plotter is used for such kind of special purposes.

A graph plotter is a device capable of tracing out graphs, designs and maps onto paper and even on plastic or metal plates. High degree of accuracy can be achieved, even upto one thousandth of an inch.



A plotter is more software dependent than any other peripheral device and it needs much more instructions than a printer.

Where is it used?

- » Used to create presentation visuals, charts, graphs, tables, diagrams - on papers or plastic sheets.
- » These are used in applications like CAD which require high quality graphics & images on paper.
- » Many plotters now available are desktop models that can be used with PCs.

Print Mechanism:

- » It is mainly intended for printing graphs and images. So, it requires free movement of printing head which is not possible in any other kinds of printers.
- » It consists of a pen which is fixed in an arm. The arm moves freely across the paper.

Types of Plotters:

- a. **Flat bed Plotter:** Here the paper is fixed while the arm and pen move over it, to print a document.
- b. **Drum Plotters:** Here the paper is fixed on the surface of a drum. The drum rotates and the plotter pens are positioned over the paper. When the paper is rotated to reach the correct point, pens are dropped on to the surface and move from left and right, under the control of a program. When the image is completely printed, pens are raised from the surface.

Stationery: To draw clear, high quality diagrams, plotters need high quality pens of different colours.

The End