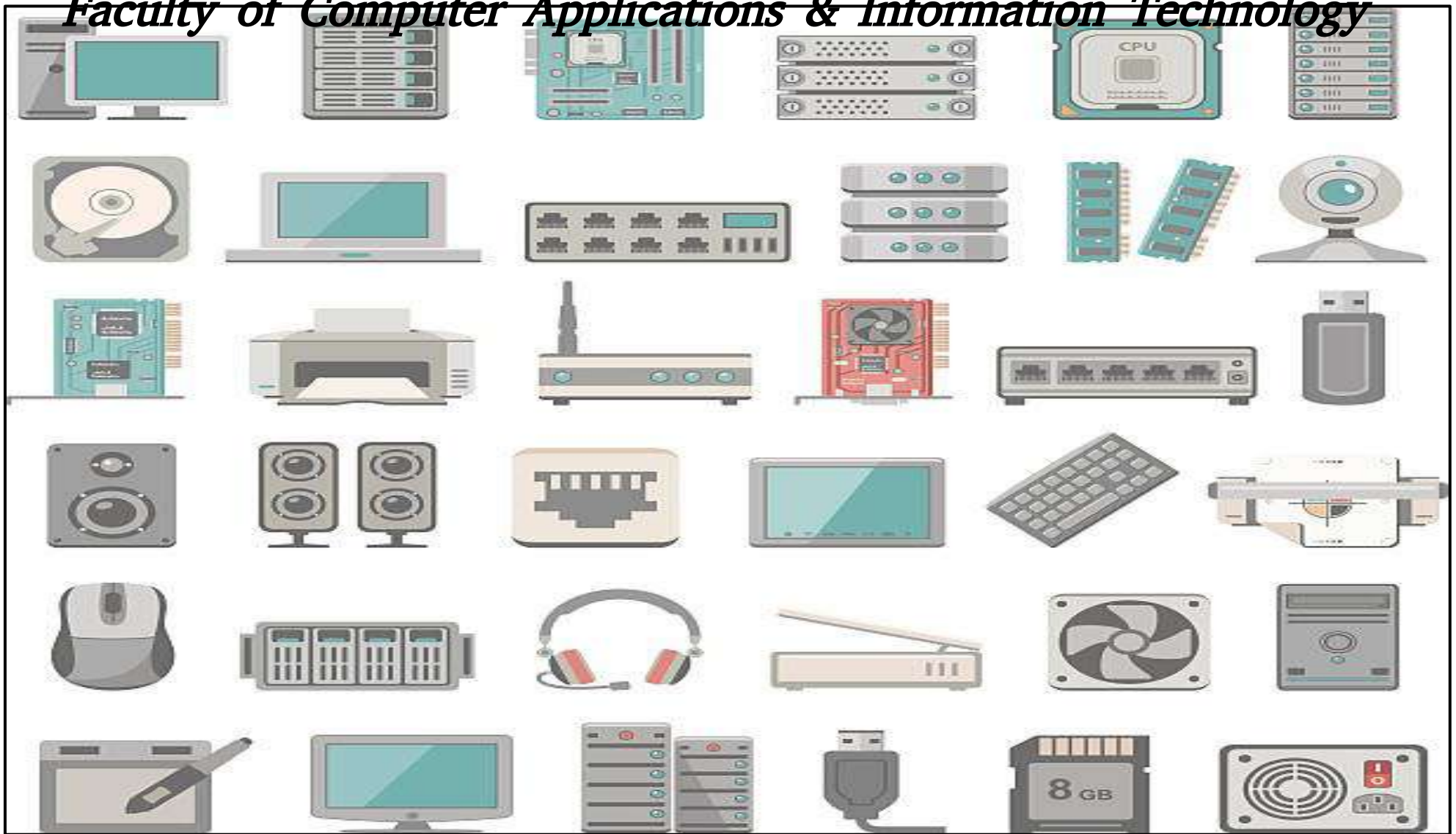


# GLS UNIVERSITY

## *Faculty of Computer Applications & Information Technology*



## Computer Hardware Devices UNIT II

Integrated IMSCIT

# Input Devices

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- An input device is a piece of hardware used to provide data to a computer used for interaction and control.
- It allows input of raw data to the computer for processing.
- It is an electromechanical device used to enter data in computer system.
- Types of input devices:
  - Text Data Input Devices
  - Selection Data Input Devices
  - Line Drawing Data Input Devices
  - Image Data Input Devices
  - Audio Data Input Devices
  - Video Data Input Devices

# Text Data Input Devices

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# Text Data Input Devices - Keyboard

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- These input devices are used to enter text data in a computer system.
- Three text data input devices are keyboard, smart pen and ocr scanner
- 1. keyboard : used to enter text data by typing using set of keys like (A,B,C...1,2,3,....,+,-,\* .... etc)
- Keys are mounted on a base ,which has wired or wireless connection with computer.
- Most popular keyboard used today is 101 -key QWERTY keyboard.

# Text Data Input Devices - Smart Pen With Writing Pad

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- An electronic pen with an electronic writing pad, used to input text data.
- A smart pen is basically a pen that contains a camera, an audio recorder, and a built-in computer that enables users to record, save, and upload data.
- There's an infrared camera at the tip of the pen that records what you write. Using special paper that employs a dot positioning system, the pattern of uniquely printed microdots are what allows the camera to follow and record the strokes of your writing.
- This device has **Optical Hand Writing Recognition (OHWR)** software that recognizes the characters & convert them into standard input characters.



# Text Data Input Devices - Smart Pen With Writing Pad

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# Text Data Input Devices - OCR Scanner

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- OCR stands for Optical Character Recognition
- It is a scanner having optical character recognition software.
- Used to input already written text from available documents like book or sheet of paper.
- Captures the bitmap image of each character from the scanned document and OCR software converts it into standard input character.



# Selection Data Input Devices

## – Track Ball



Track Ball : ia small ball that is set in a holder and can be rotated by hand to move a cursor on a computer screen.

# Selection Data Input Device

## – Touch Screen

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- A touch screen is a display device that allows the user to interact with a computer by using their finger or stylus.
- Touch screens are used on a variety of devices, such as computer and laptop displays, smartphones, tablets, cash registers, and information kiosks.
- Some touch screens use a grid of infrared beams to sense the presence of a finger instead of utilizing touch-sensitive input.

# Selection Data Input Devices

## – Touch Pad

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- Also called a glide pad, glide point, pressure-sensitive tablet, or trackpad, a touchpad is an input device on laptops and some keyboards.
- It allows the user to move a cursor with their finger.
- It can be used in place of an external mouse.

# Selection Data Input Devices

## – Mouse

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- A computer mouse is a handheld hardware input device that controls a cursor in a GUI (graphical user interface) and can move and select text, icons, files, and folders on your computer.

# Selection Data Input Devices

## – Joystick

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- A joystick is an input device that can be used for controlling the movement of the cursor or a pointer in a computer device.
- The pointer/cursor movement is controlled by maneuvering a lever on the joystick.
- The input device is mostly used for gaming applications and, sometimes, in graphics applications.

# Line Drawing Data Input Devices

## Digitizer

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- A digitizer tablet (also known as a digitizer or graphics tablet) is a tool used to convert hand-drawn images into a format suitable for computer processing.
- Digitizer tablets can also be used as an input device, receiving information represented in drawings and sending output to a CAD (computer aided design) application and PC-based software like AutoCAD.



# Line Drawing Data Input Devices – Smart Pen

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- A smart pen is basically a pen that contains a camera, an audio recorder, and a built-in computer that enables users to record, save, and upload data.
- There's an infrared camera at the tip of the pen that records what you write.
- Using special paper that employs a dot positioning system, the pattern of uniquely printed microdots are what allows the camera to follow and record the strokes of your writing.

# Image Data Input Devices – Digital Camera

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- A digital camera is a hardware device that takes photographs and stores the image as data on a memory card.
- Unlike an analog camera, which exposes film chemicals to light, a digital camera uses digital optical components to register the intensity and color of light, and converts it into pixel data.
- Many digital cameras are capable of recording video in addition to taking photos.

# Image Data Input Devices – Scanners

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- A scanner is a device that captures images from photographic prints, posters, magazine pages, and similar sources for computer editing and display.
- A scanner or optical scanner is a hardware input device that optically "reads" an image and converts it into a digital signal.
- For example, a scanner may be used to convert a printed picture, drawing, or document (hard copy) into a digital file which can be edited on a computer.

# Image Data Input Devices – Types of Scanners

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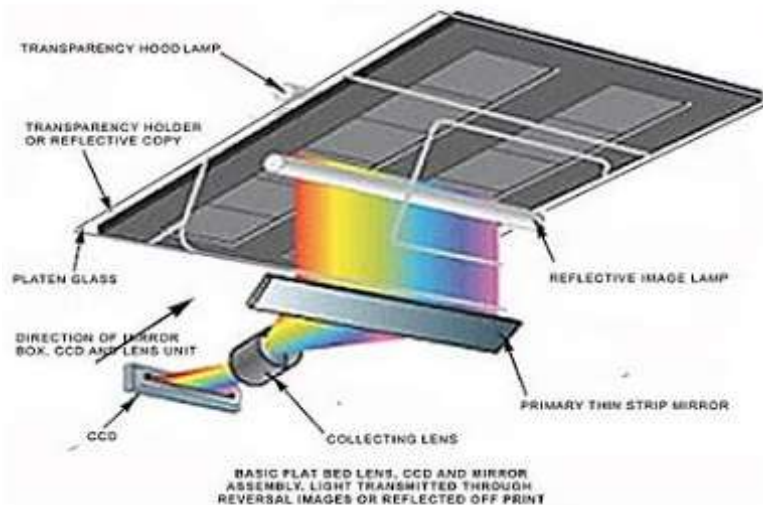
Flatbed Scanner



Sheet fed Scanner



Portable Scanner



# Image Data Input Devices – Types of Scanners

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- *Flatbed Scanner*
- *Sheet fed Scanner*
- *Handheld Scanner*
- *Drum Scanner*
- *Photo Scanner*
- *Film Scanner*
- *Portable Scanners*

# Image Data Input Devices – Bar Code Reader

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- Its input device for decoding barcode data and inputting the same to a computer system



# Audio Data Input Devices – Microphone

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- It is used to recording human voice.
- Microphone converts sound waves to electrical signals, which is then input to the computer system.

# Audio Data Input Devices – MIDI

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- **Musical Instrument digital interface.**
- A MIDI device like electronic Keyboard, electronic drum etc is an audio input device for input of audio information generated by digital electronic equipment into a computer system.



# Audio Data Input Devices – MIDI

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# Video Data Input Devices – MIDI

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- Video data input devices are used for video recording.
- Ex : Digital Video Camera
- Used to convert light waves to electrical signals.
- Webcam : A webcam is a compact digital camera you can hook up to your computer to broadcast video images in real time (as they happen). Just like a digital camera,



# Output Devices

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## Hard-Copy Output Devices

### **Impact Printers**

Dot-Matrix Printer

Line Printer (Drum printer  
, Chain Printer)

### **Non-Impact Printers**

Ink Jet Printer

Laser Printer

### **Plotters**

## Soft-Copy Output Devices

### **Monitor**

**Video Output:**

**Audio Output:**

## Output Devices for Printing 3D Objects

**3D Printer**

# Hardcopy Output Devices –

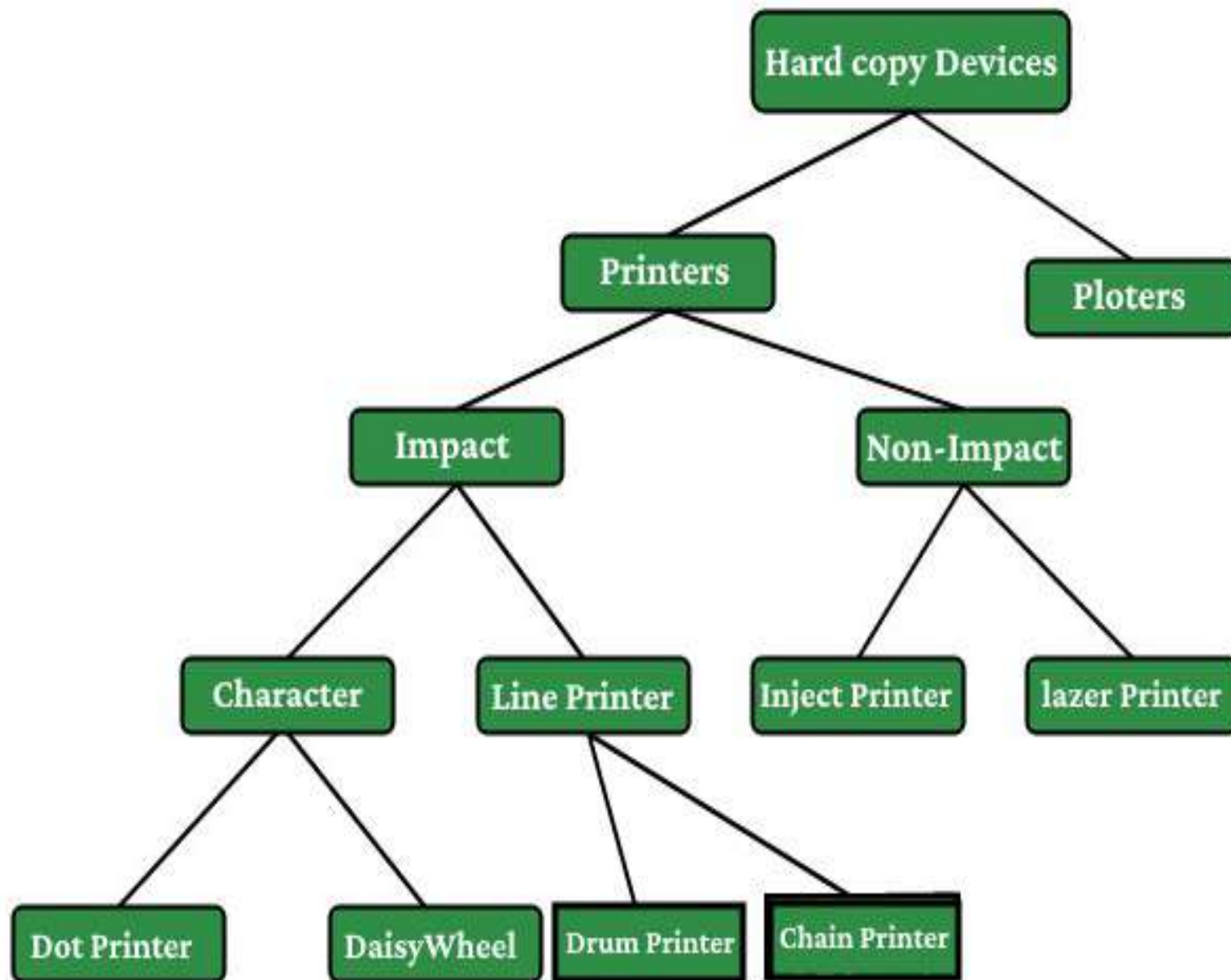
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- A hard copy is a printed copy of information from a computer. Sometimes it refers to a printer, so it is called a hard copy because it exists as a physical object. A hard copy is a tangible output that is usually printed. The principal examples are printouts, whether text on graphics, form printers, and also films including microfilms and microfiche is also considered as hardcopy output.

## **Hard Copy Output Devices:**

- It is an electromagnetic device, which accepts data from a computer and translates them into forms understood by users. Output devices:- printers and plotters.





# Output Devices - Printers

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- **Printers:** A printer is an external hardware output device responsible for taking electronic data stored on a computer and generating a hard copy of that data i.e. used to print information on paper.
- **Impact Printers**
  - Dot-Matrix Printer
  - Line Printer (Drum printer , Chain Printer)
- **Non-Impact Printers**
  - Ink Jet Printer
  - Laser Printer
- **Plotters**

# Output Devices - Impact Printer

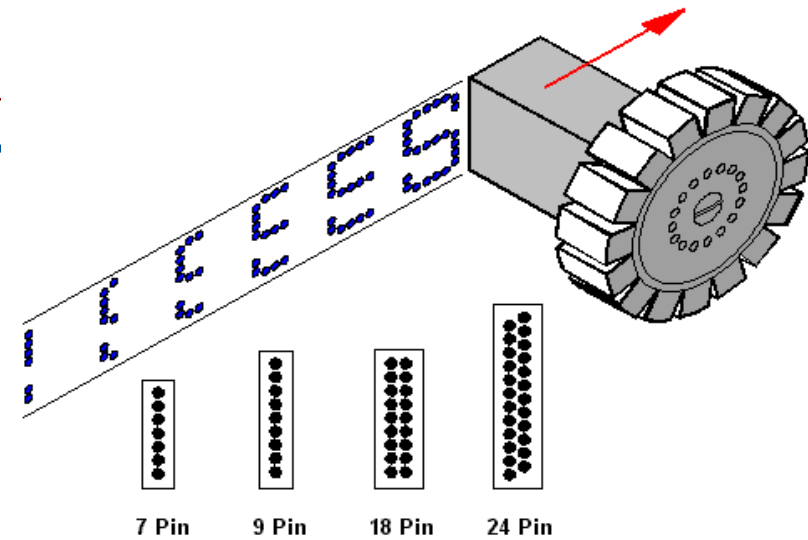
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- Impact printers print by hammering on a paper and inked ribbon against characters/pins to leave ink impressions on the paper.

# Impact Printers – Dot Matrix Prin

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- **Dot Matrix Printer:** The dot-matrix printer uses print heads containing from 9 to 24 pins. These pins produce patterns of dots on the paper to form the individual characters.
- The pins strike the ribbon individually as the print mechanism moves across the entire print line in both directions.
- Dot-matrix printers are inexpensive and typically print at speeds of 100-600 characters per second.
- These printers are popular because of their ease of printing and economical price.
- **Advantages:** Inexpensive, Widely Used, Other language characters can be printed
- **Disadvantages:** Slow Speed, Poor Quality

# Impact Printers - Line printers

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- In business where enormous amount of material are printed, the character-at-a-time printers are too slow; therefore, these users need line printers.
- Line printers, use special mechanism that can print a whole line at once; they can typically print the range of 1,200 to 6,000 lines per minute.
- There are two types of **Line Printers**:
  - **Drum Printer**
  - **Chain Printer**

# Impact Printers - Drum Printers

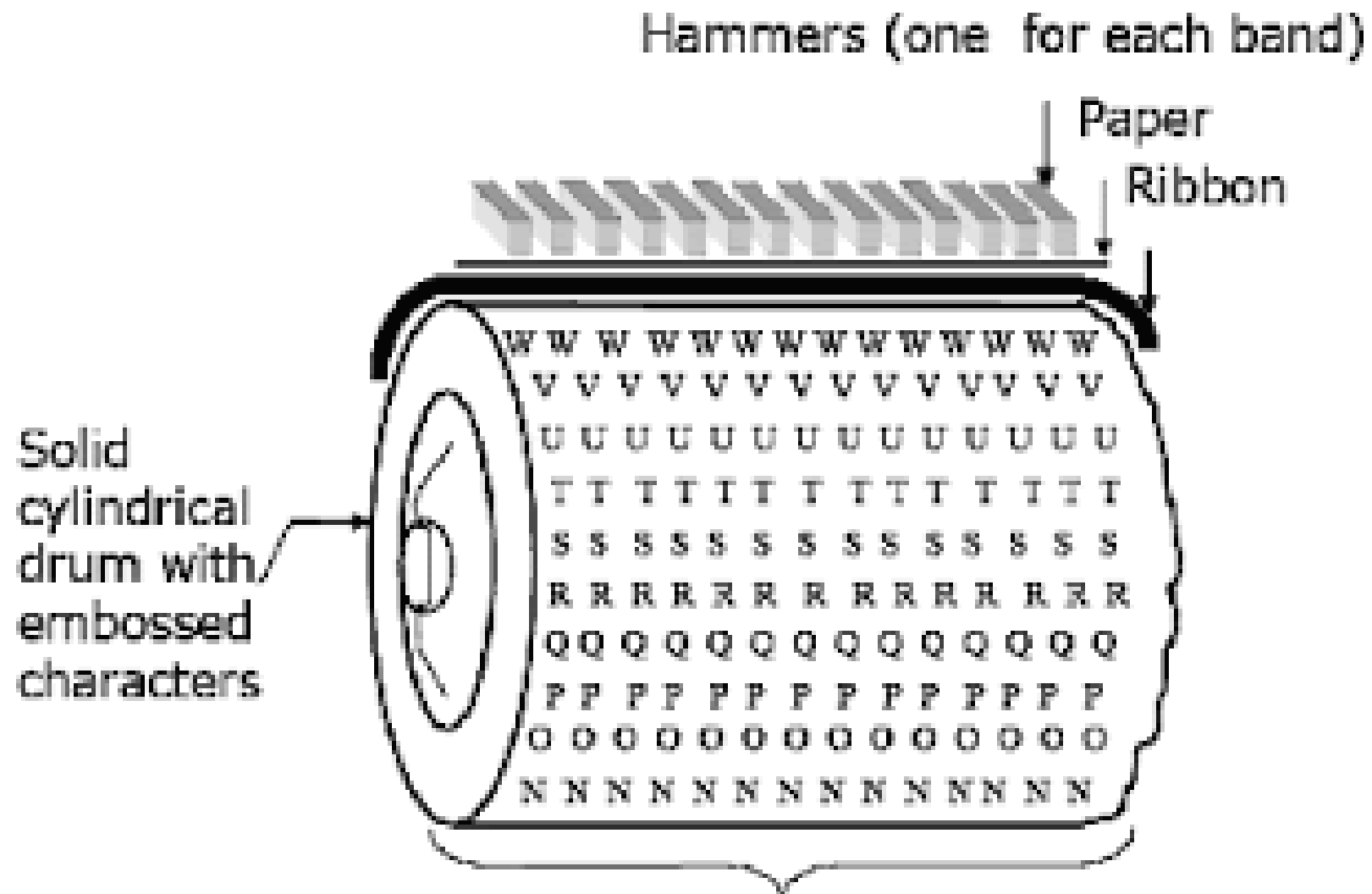
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- This printer is like a **drum** in shape so it is called drum printer.
- The surface of drum is divided into **number of tracks**.
- **Total tracks are equal to size of paper** i.e. for a paper width of 132 characters, drum will have 132 tracks.
- A character set is embossed on track.
- The different character sets are available like 48 character set, 64 and 96 characters set.
- **One rotation of drum prints one line.**
- Drum printers are fast in speed and can print 300 to 2000 lines per minute.
- **Advantages:** Very high speed
- **Disadvantages:** Very expensive, Characters fonts cannot be changed.



# Impact Printers - Drum Printers

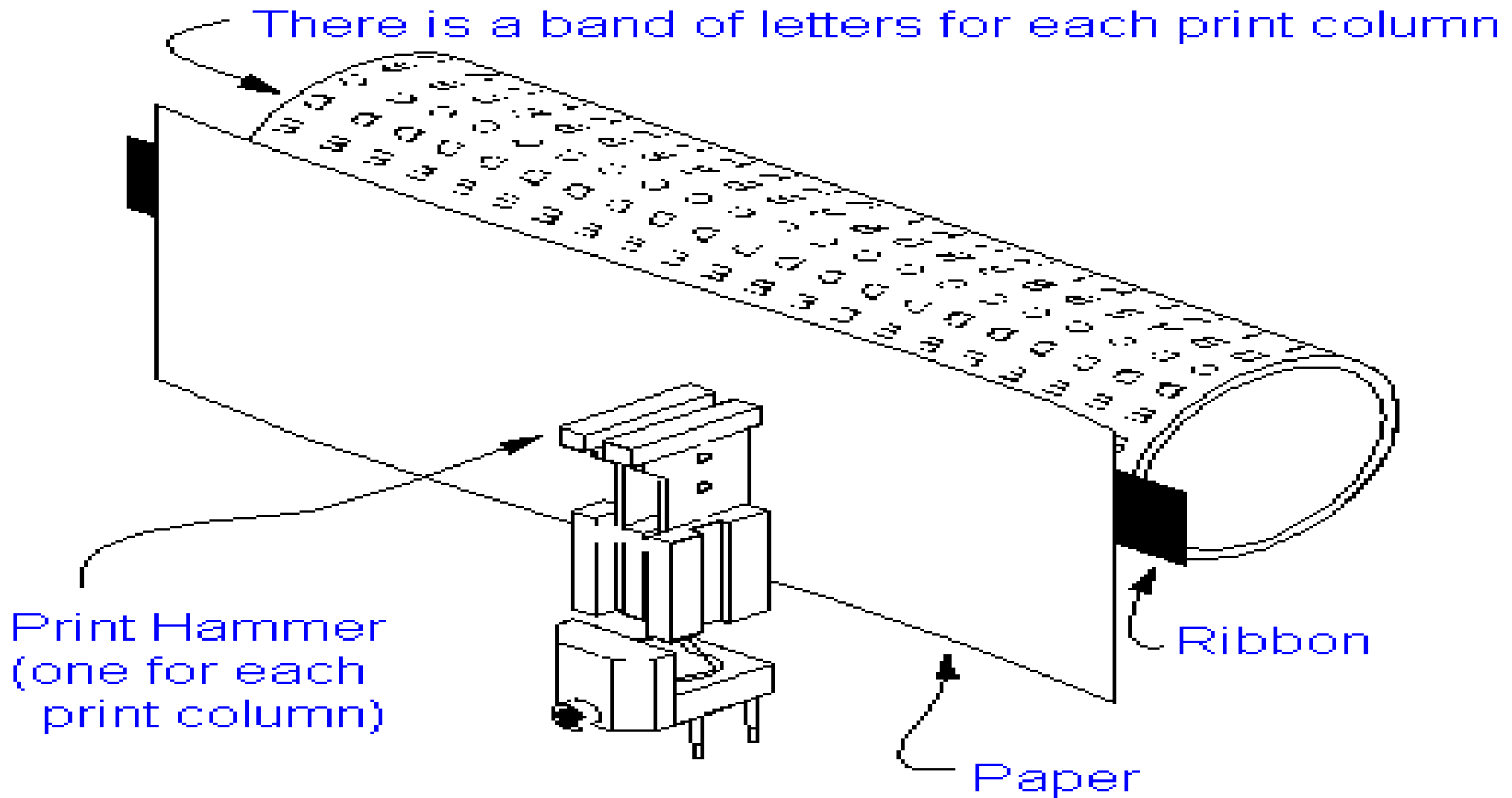
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Total number of bands is equal to the maximum number of characters (print positions) on a line

# Impact Printers - Drum Printers

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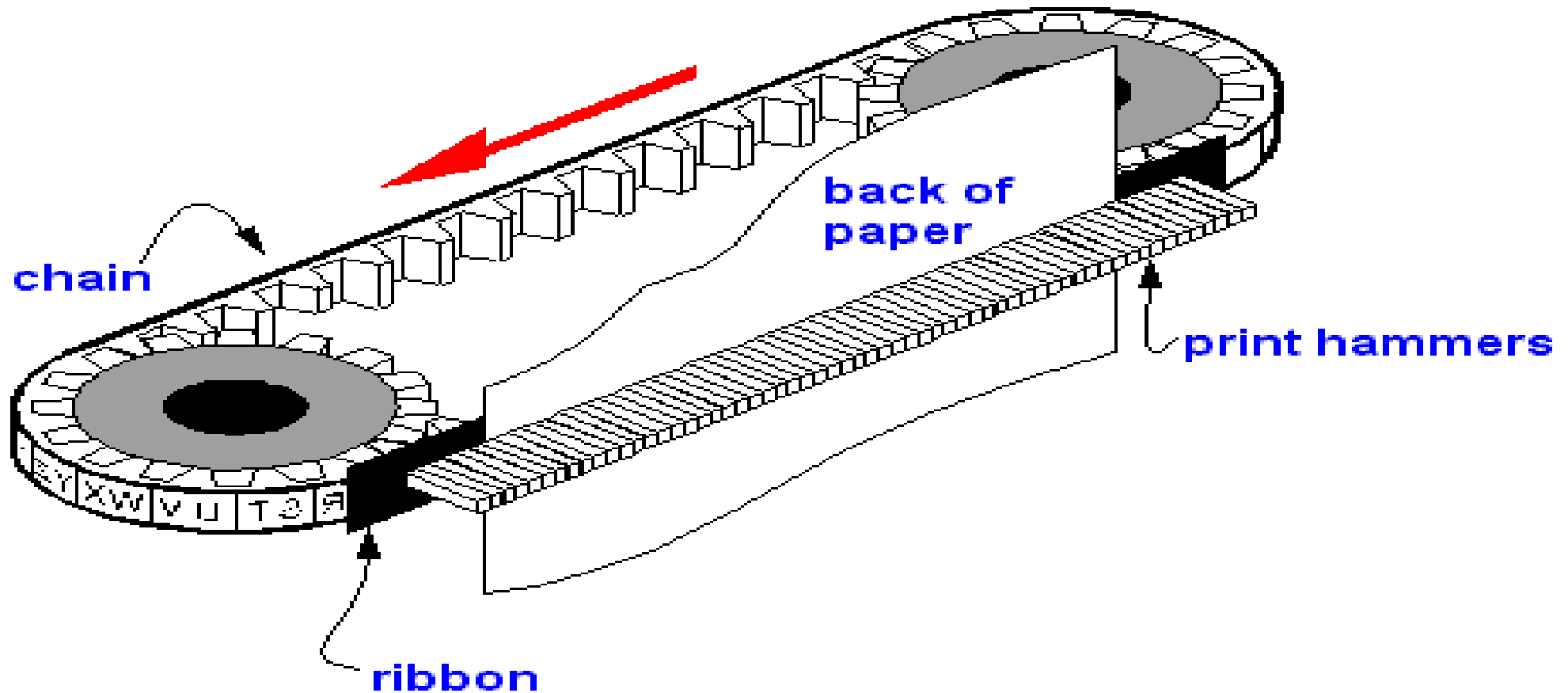
# Impact Printers - Chain Printers

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- In this printer, chain of character sets are used so it is called Chain Printer.
- A standard character set may have 48, 64, or 96 characters.
- There is one hammer for each print position.
- Circuitry inside the printer detects when the correct character appears at the desired print location on the page.
- The hammer then strikes the page, pressing the paper against a ribbon and the character located at the desired print position.
- Speeds of chain printers range from 400 to 2500 characters per minute.
- **Advantages:** Character fonts can easily be changed, Different languages can be used with the same printer.
- **Disadvantages:** Noisy

# Impact Printers - Chain Printers

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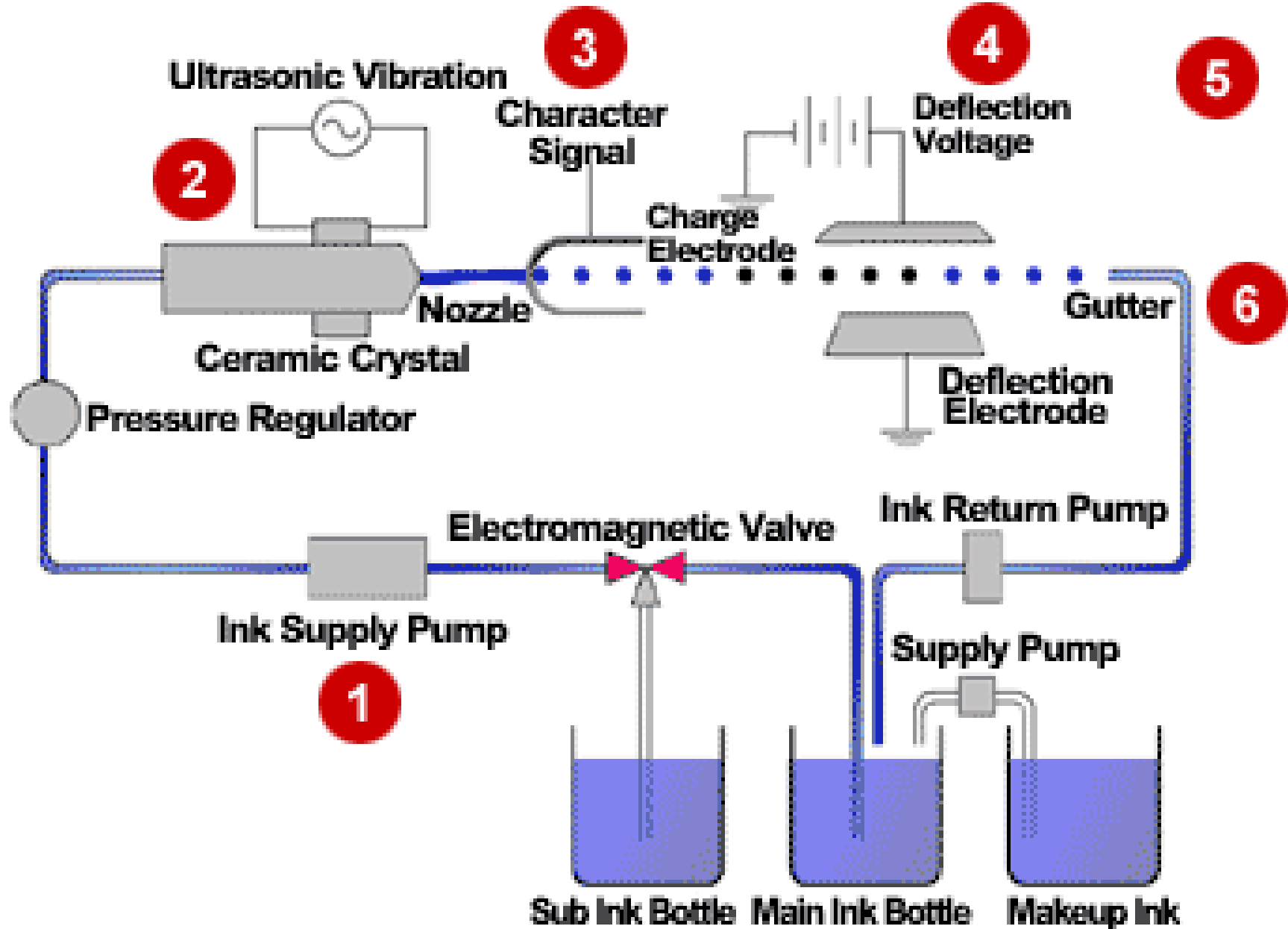
# Non Impact Printers - Ink Jet Printer

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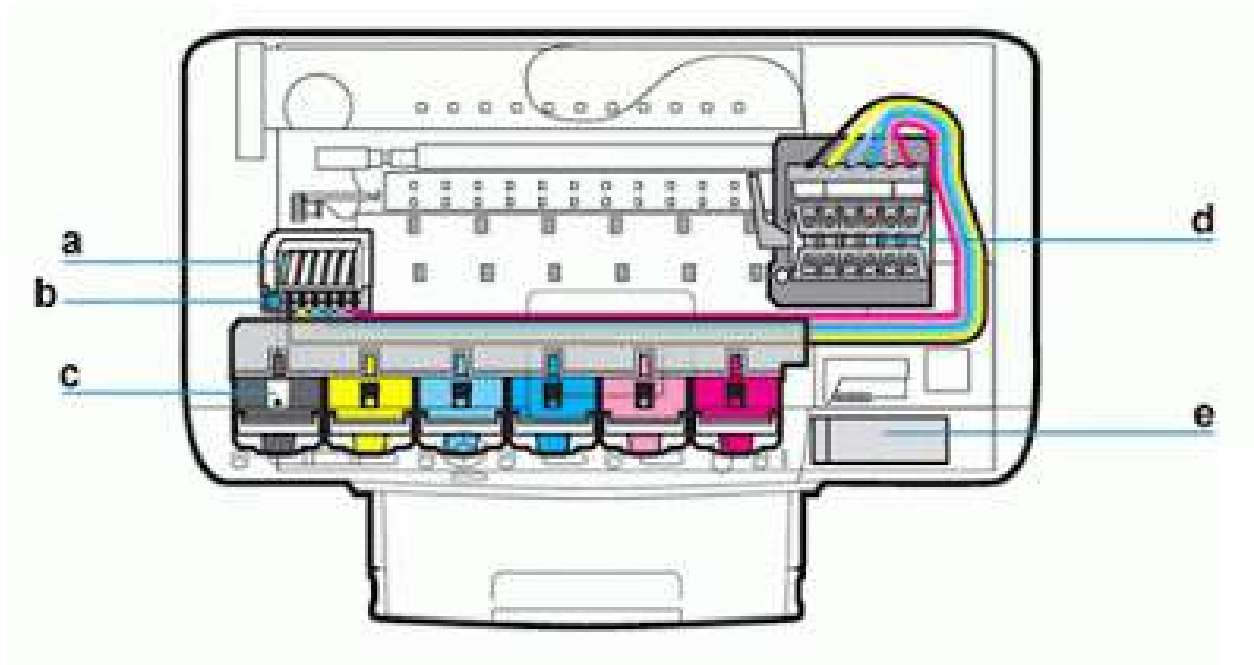


- Inkjet printers print characters by spraying small drops of ink onto paper. Inkjet printers produce high-quality text and graphics.
- They make less noise because no hammering is done.
- Colour printing is also possible.
- Print the range of 250 characters per second.
- These printers are a better choice if user uses one color more than other colors.
- **Advantages:** High quality printing, More reliable.
- **Disadvantages:** Expensive as cost per page is high, Slow as compared to laser printer.

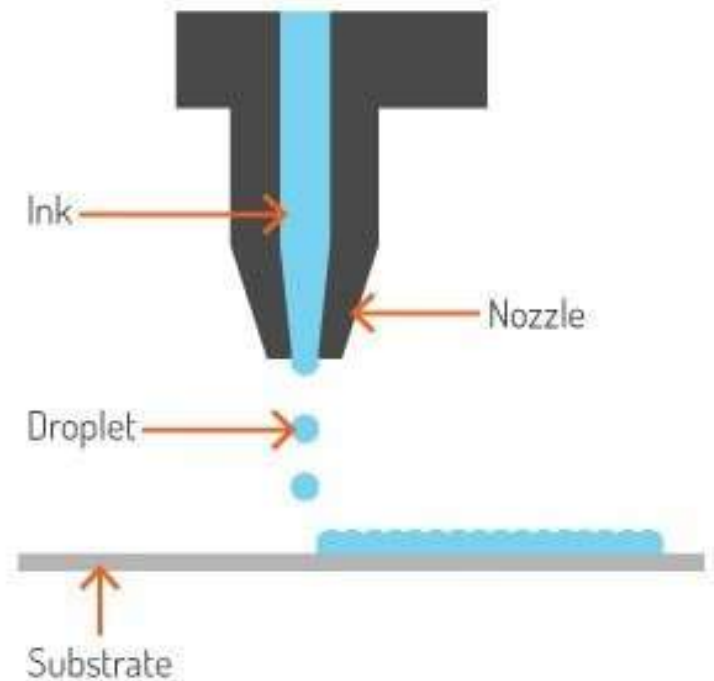
# Non Impact Printers - Ink Jet Printer



# Non Impact Printers - Ink Jet Printer



## INKJET PRINTING





# Non Impact Printers – Laser Printer

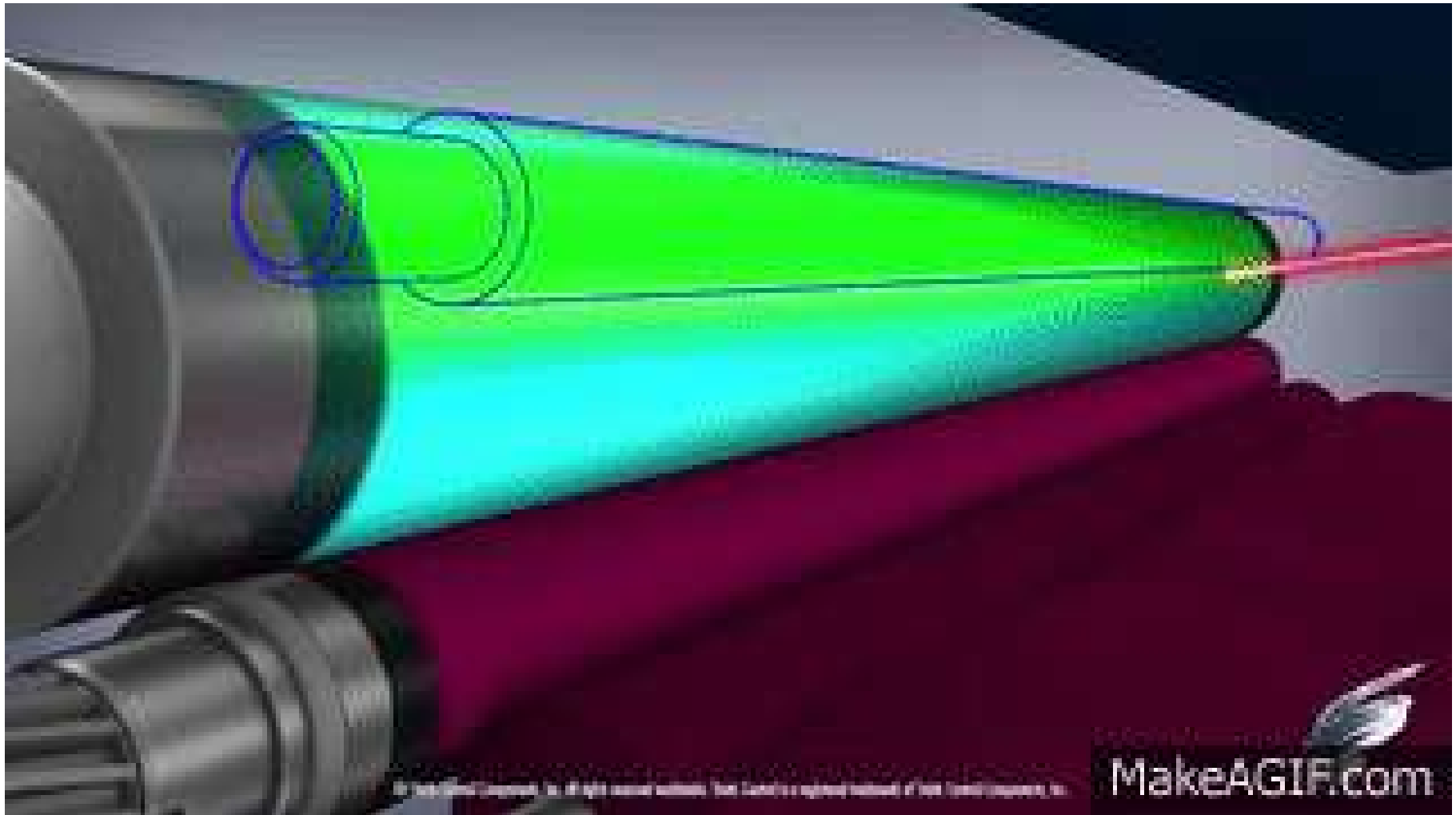
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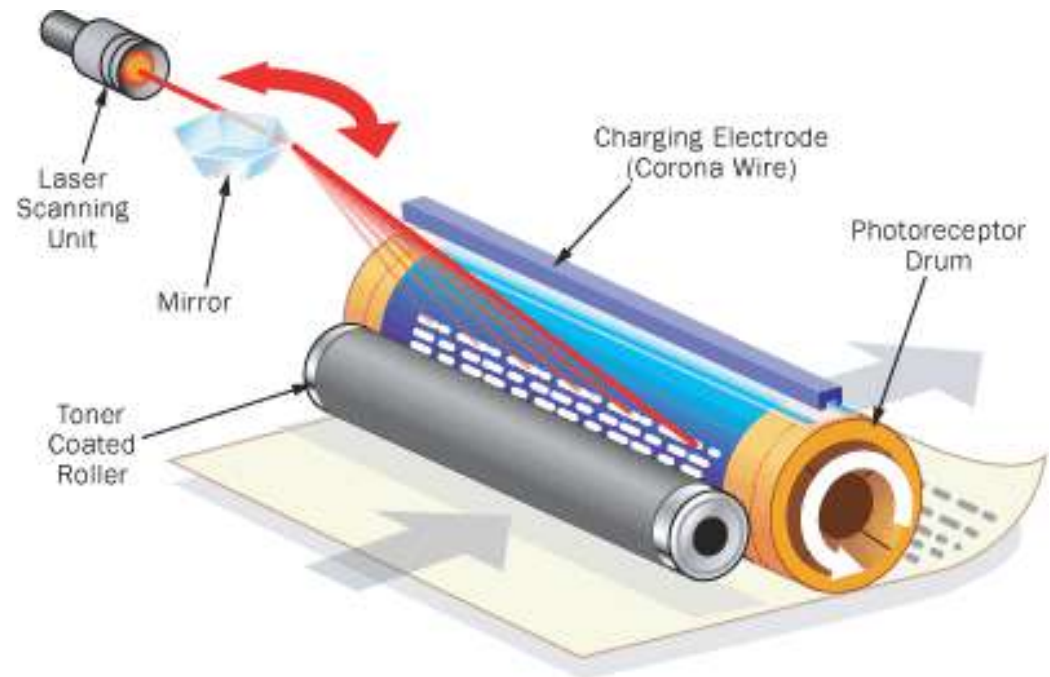
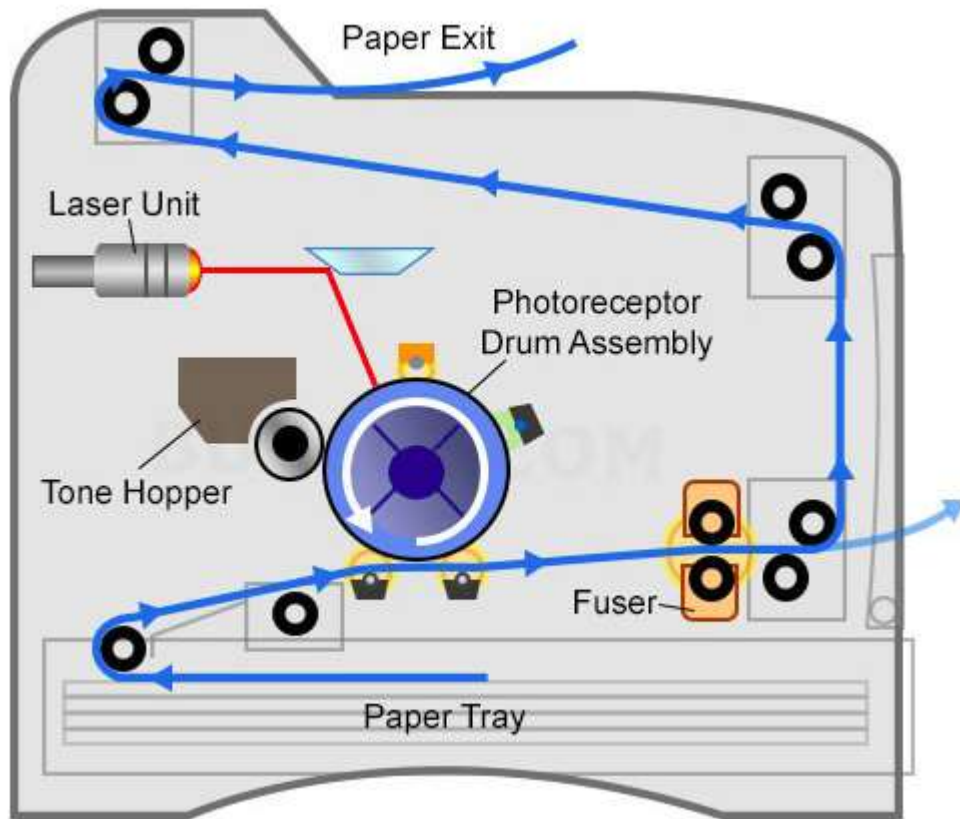
- A laser printer works like a photocopier machine.
- Laser printers produce images on paper by directing a laser beam at a mirror which bounces the beam onto a drum.
- They use laser lights to produce the dots needed to form the characters to be printed on a page.
- It uses buffers that store an entire page at a time. When a whole page is loaded, it will be printed. The speed is high and it does not produce much noise.
- It prints approximately 21,000 lines per minute.
- **Advantages:** High quality output, high speed, good graphics quality, Support many fonts and different character size.
- **Disadvantages:** Expensive, Cannot be used to produce multiple copies of a document in a single printing.

# Non Impact Printers – Laser Printer

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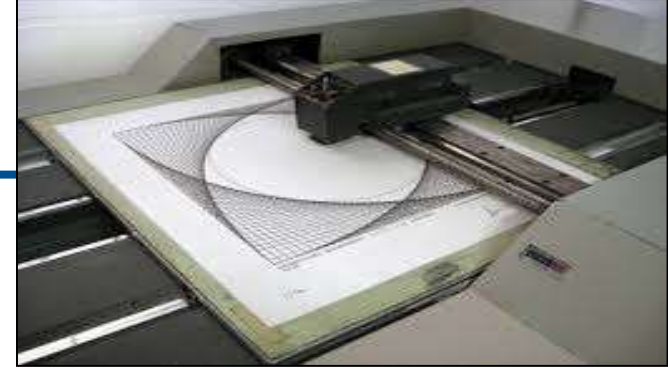


# Non Impact Printers – Laser Printer



# Non Impact Printers - Plotters

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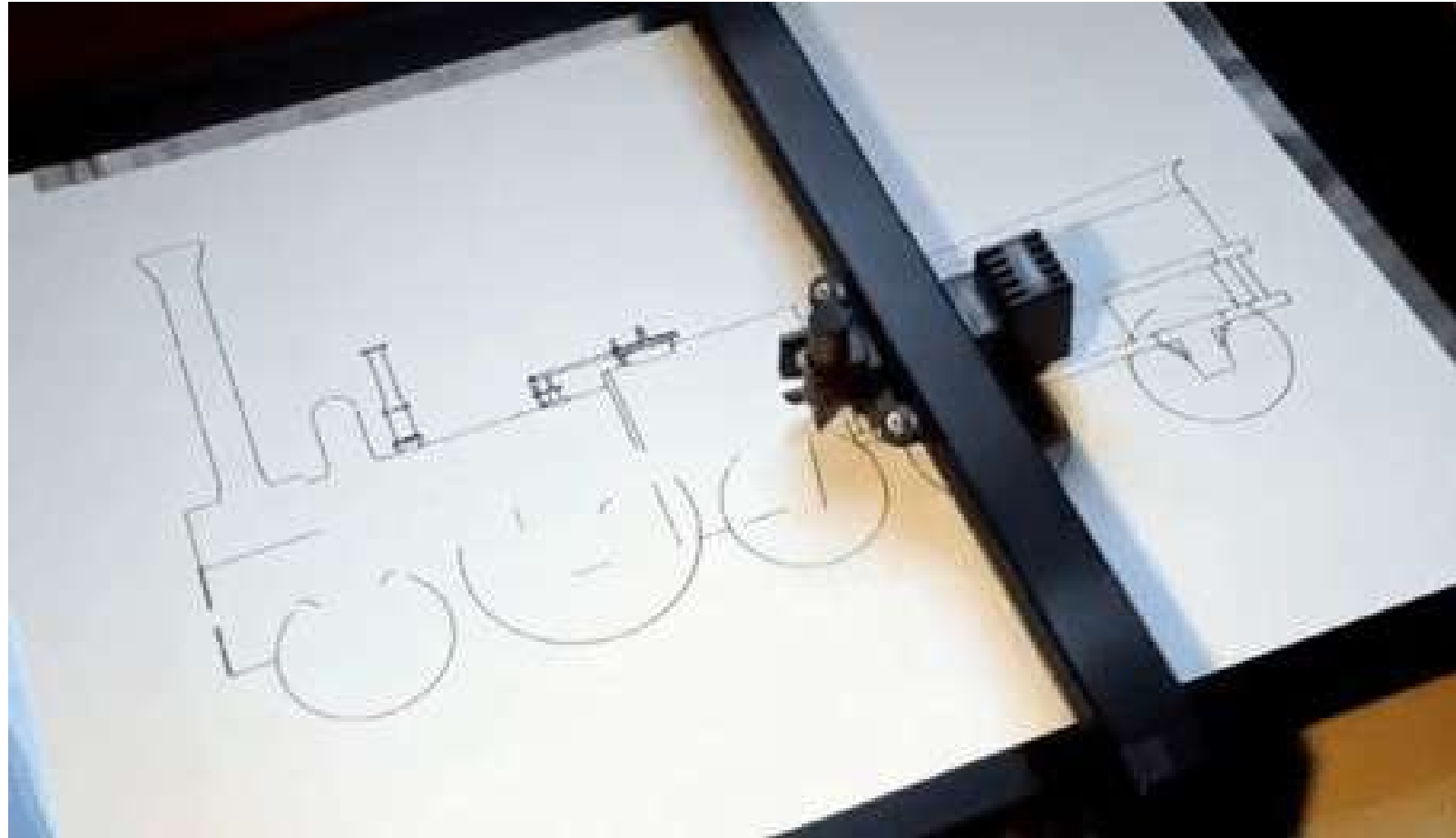


- Plotter is used to produce high quality graphics in multiple colour.
- Plotter is used to create maps, charts etc. on a paper sheet.
- Plotters use a pen, pencil, marker, or another writing tool.
- It draws multiple, continuous lines onto paper rather than a series of dots like a traditional printer.
- Plotter is most frequently used for CAE (computer-aided engineering) applications, such as CAD (computer-aided design).
- Used by architects, engineers, city planners and others to generate high precision hard copy graphic output on large sheets.

# Non Impact Printers - Plotters

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- **Advantages:** work on very large sheets of paper, They can print on a wide variety of flat materials including plywood, aluminum, sheet steel, cardboard, and plastic.
- **Disadvantages:** Plotters are quite large and also also much more expensive.

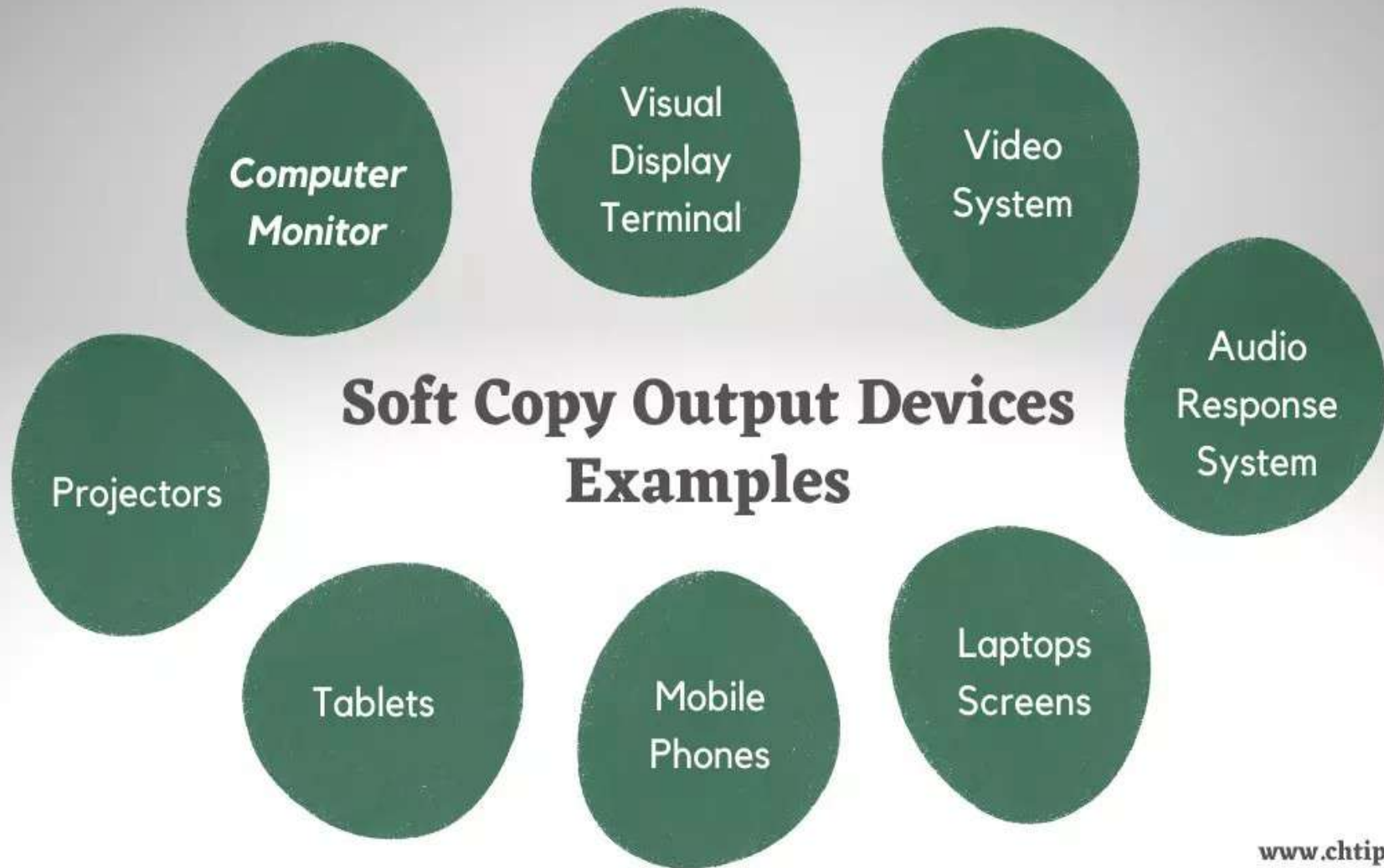


# Non Impact Printers - Flatbed Plotter

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- A flatbed plotter has a rectangular flatbed table over which the sheet of paper on which the design is to be plotted is spread and fixed.
- Drum Plotter : has a cylindrical drum that rotates in clockwise and anti-clockwise direction to produce vertical motion.





# Soft Copy Output Devices

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- Soft copy refers to the digital document file or electronic version of a document that is not printed on paper. In soft copy the output is present in the USB drives and computers etc and sometimes it is referred as temporary copy. We can not touch the soft copy. We can say it is a virtual copy. For example- ENews paper, Ebook, pdf notes, scanned notes etc.
- The output obtained in an intangible form on a visual display, audio unit or video unit is called soft copy output. The soft copy allows corrections to be made, can be stored, and, can be sent via E- to other users. The soft copy output requires a computer to be read or used. The devices that generate soft copy output are called soft copy devices. Visual output devices like computer monitor, visual display terminal, video system and audio response system are common soft copy output devices.

# Soft Copy Output Devices : Monitor

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- Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information.
- The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in.
- It also displays the program or application output. Like the television, monitors are also available in different sizes.

# Monitors

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- Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer.
- It forms images from tiny dots, called pixels that are arranged in a rectangular form.
- The sharpness of the image depends upon the number of pixels.
- There are two kinds of viewing screen used for monitors.
  - CRT Monitor
  - LCD Monitor
  - LED Monitor/ OLED
  - Plasma Monitor

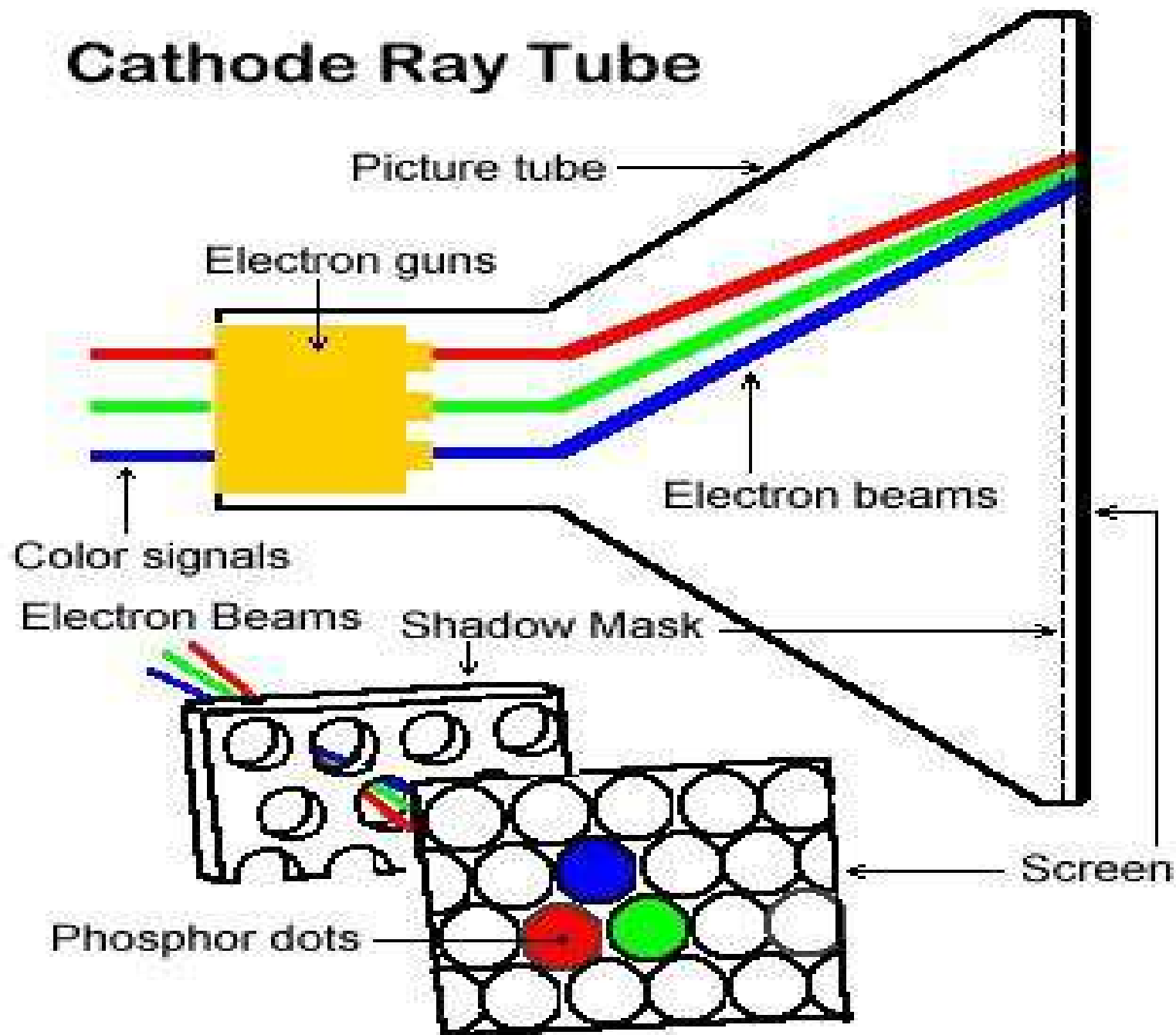
# Monitors - CRT Monitor

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- CRT monitors are based on the cathode ray tubes.
- They are like vacuum tubes which produce images in the form of video signals.
- The main components of a CRT monitor include the
  - electron gun assembly,
  - deflection plate assembly,
  - fluorescent screen,
  - glass envelope, and base.
- The front (outer surface) of the screen onto which images are produced is called the face plate. It is made up of fiber optics.

# Monitors - CRT Monitor

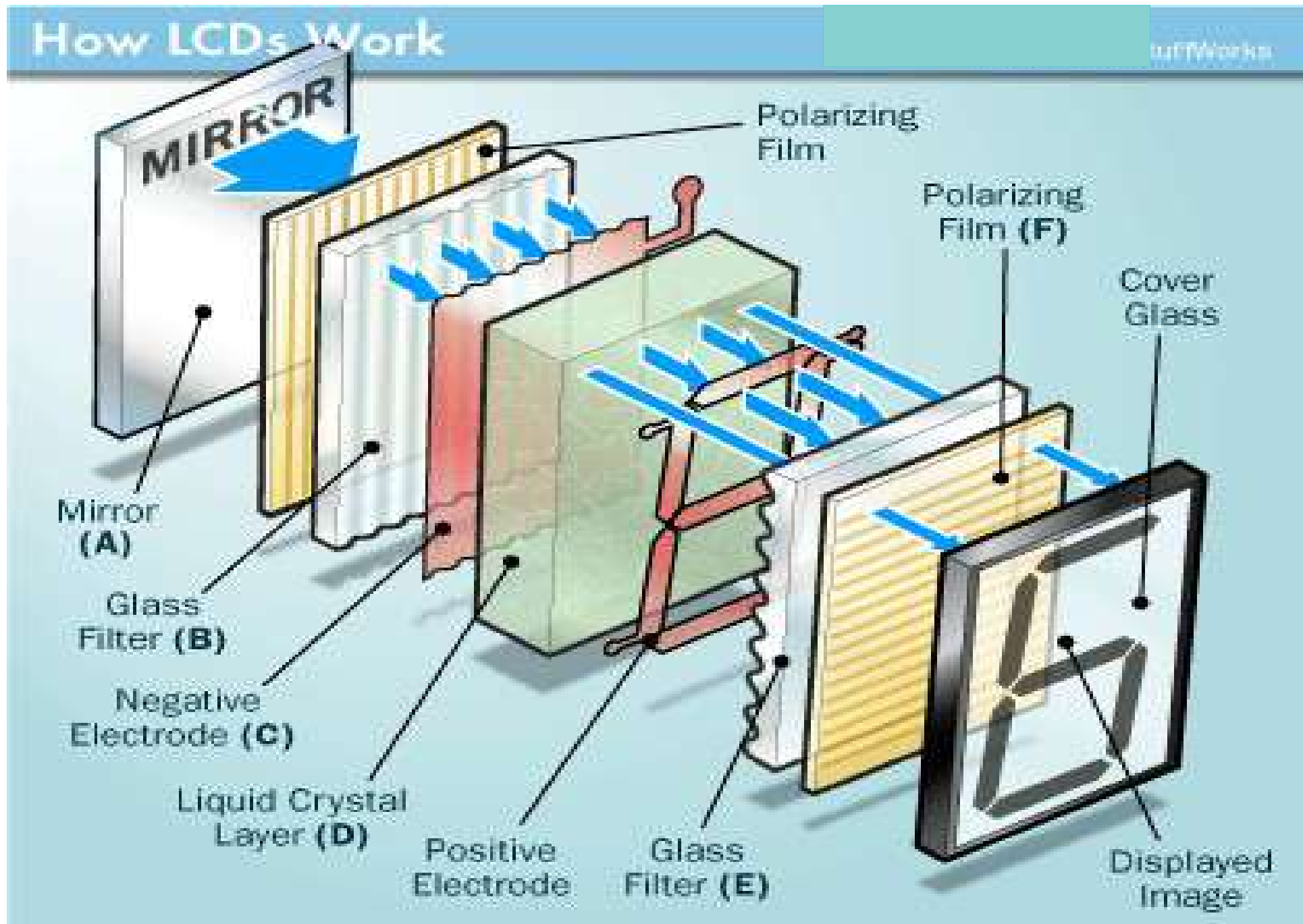


# Monitors - LCD Monitor



- The LCD monitor is a flat panel screen that is compact and light-weight as compared to CRT monitors.
- It is based on liquid crystal display technology which is used in the screens of laptops, tablets, smart phones, etc.
- The LCD screen has a matrix of pixels that display the image on the screen.
- Old LCDs had **passive-matrix** screens in which individual pixels are controlled by sending a charge
- Modern LCDs use **active-matrix** technology and contain thin film transistors (TFTs) with capacitors.

# Monitors - LCD Monitor





# Monitors - LED Monitor

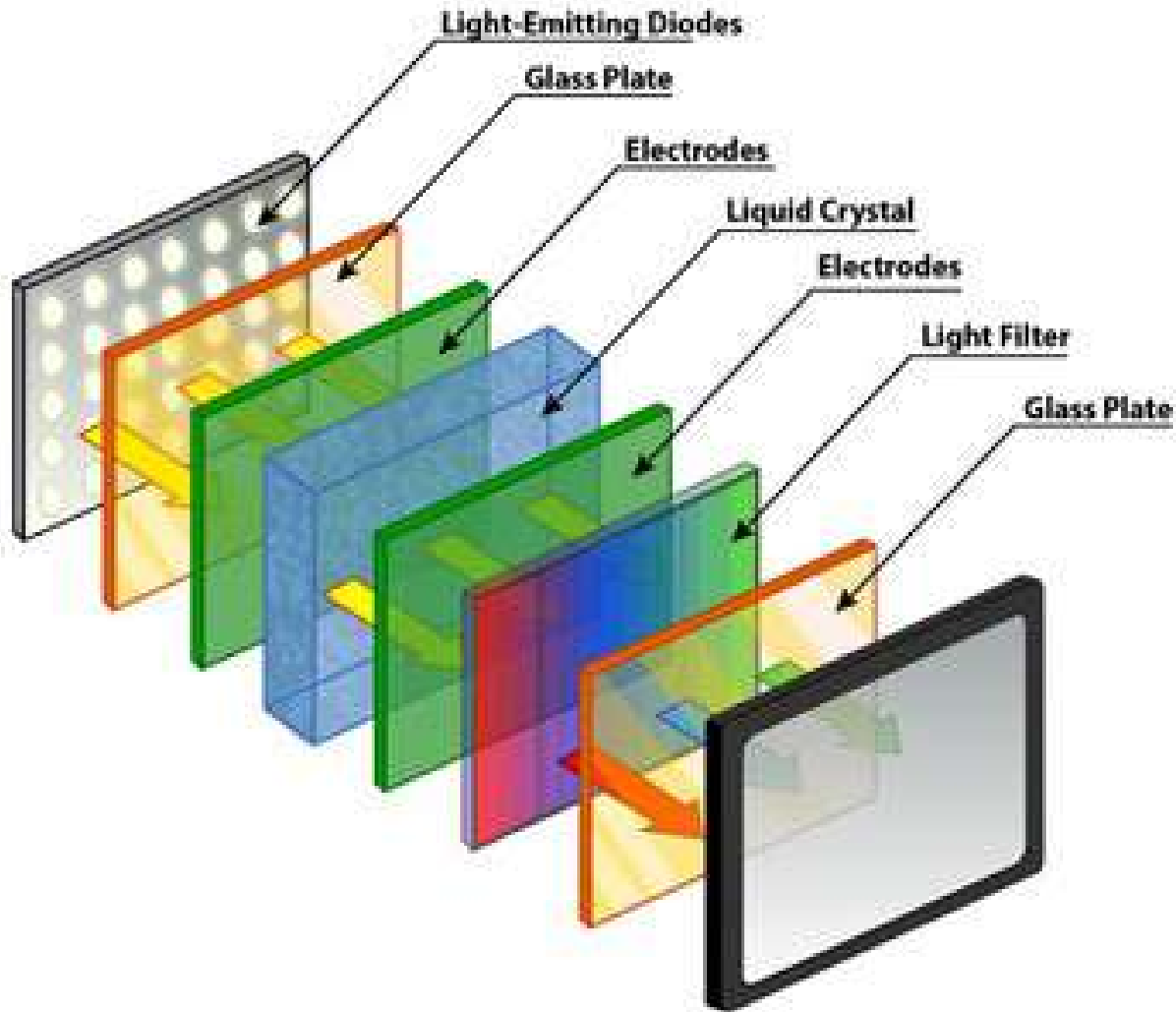
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- The LED monitor is an improved version of an LCD monitor.
- It also has a flat panel display and uses liquid crystal display technology like the LCD monitors.
- The difference between them lies in the source of light to backlight the display.
- The LED monitor has many LED panels, and each panel has several LEDs to backlight the display.
- The LCD monitors use cold cathode fluorescent light to backlight the display.
- Modern electronic devices such as mobile phones, LED TVs, laptop and computer screens, etc., use a LED display as it not only produces more brilliance and greater light intensity but also consumes less power.

# Monitors - LED Monitor

## LED Technology Process



LED light source: shining through liquid crystal cells and glass plates.

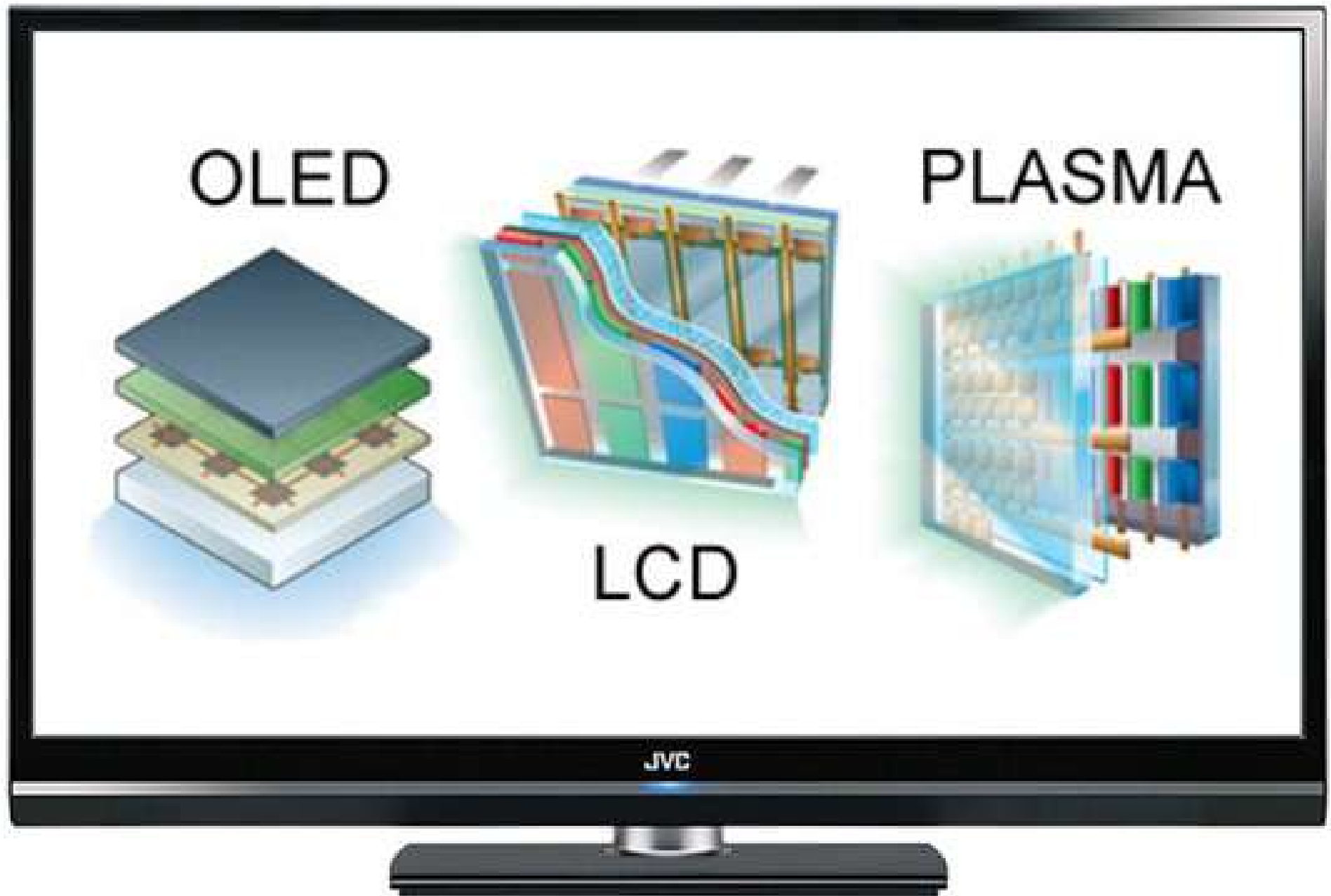
# Monitors - Plasma Monitor

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- The plasma monitor is also a flat panel display that is based on plasma display technology.
- It has small tiny cells between two glass panels.
- These cells contain mixtures of noble gases and a small amount of mercury.
- Plasma monitors provide high resolutions of up to 1920 X 1080, excellent contrast ratios, wide viewing angle, a high refresh rate and more.

# Monitors



# Soft Copy Output Devices :

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## Video Output:



- Screen image projector or data projector is an output device that displays information from the computer onto a large white screen.
- The projector is mainly used to display visual output to a large gathering of people required for the purposes of teaching, training, meetings, conference presentations, etc.

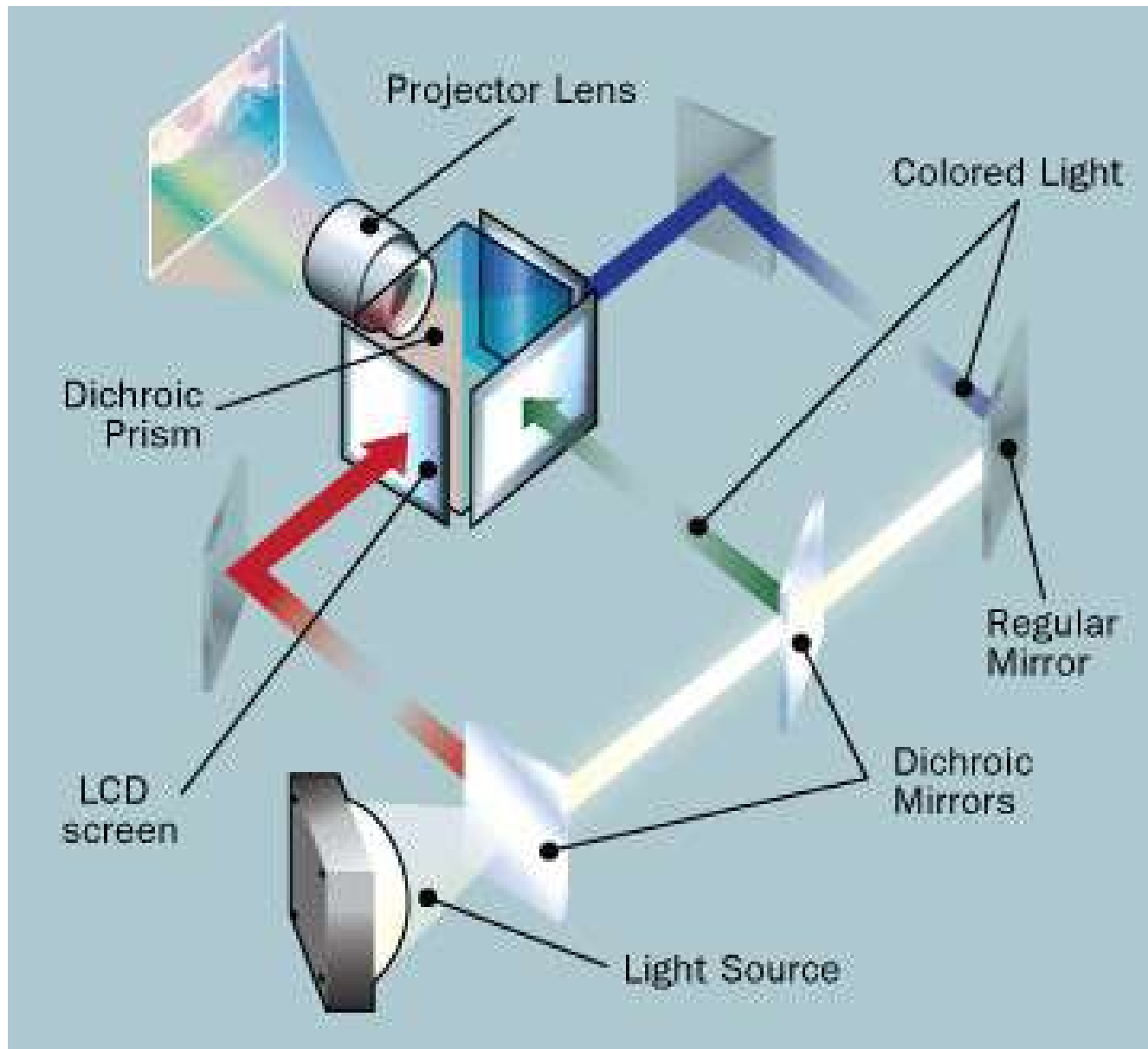
# Image Projector

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- Image projector enables a user to project a computer's output on a large screen.
- It produces temporary , soft copy output only.
- **Display Screen** : used to display the output on a tv like screen
- Known as VDT (Video Display Terminal).
- Comes in various shapes and sizes, usually measured in inches(17",19",21" etc) which refers to the diagonal length of the screen
- DLP and LCD

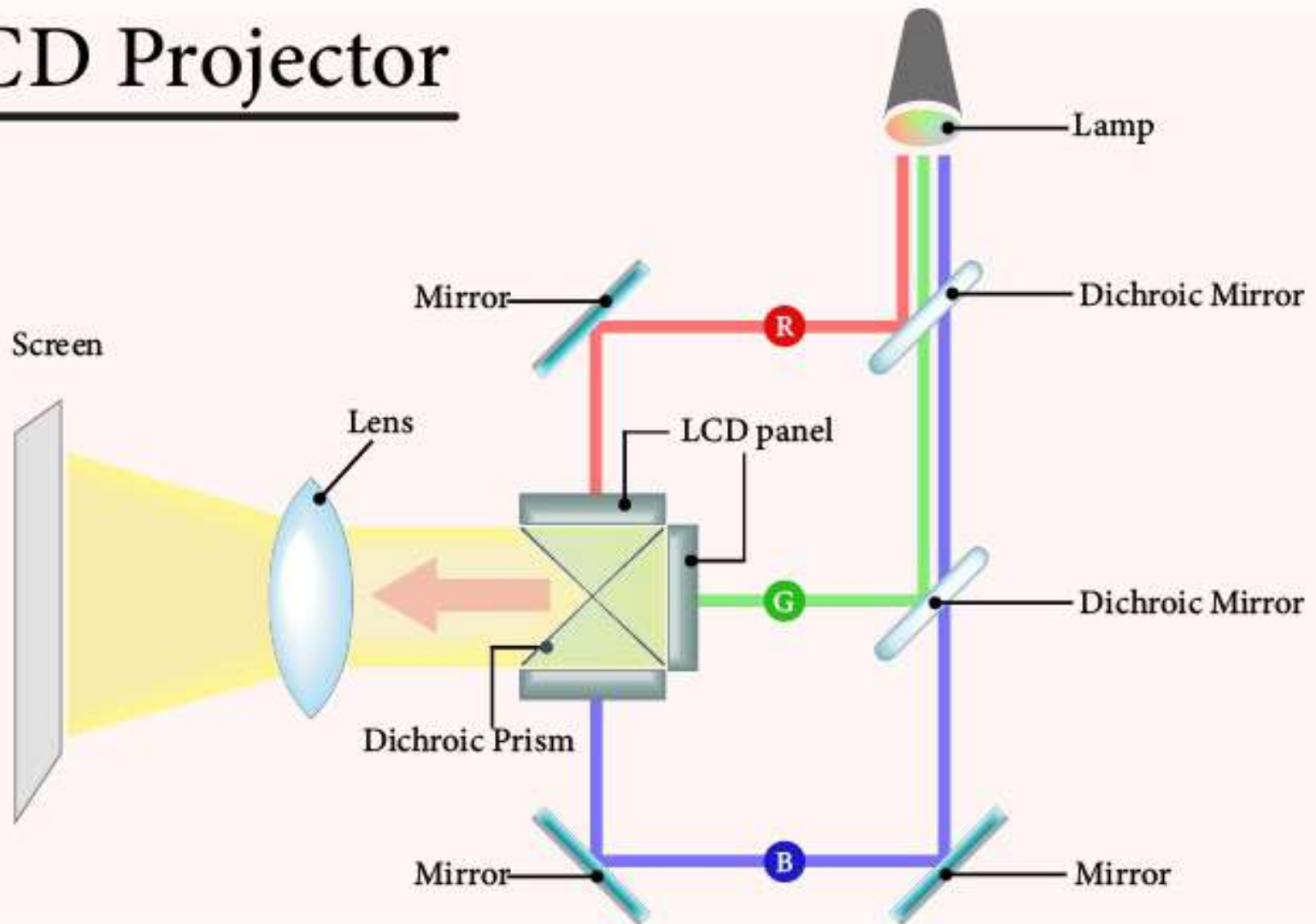
# Image Projector





# Image Projector

## 3LCD Projector



# Soft Copy Output Devices :

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## Audio Output:

- The Audio output is the ability of the computer to output sound. Two components are needed: Sound card – Plays contents of digitized recordings, Speakers – Attached to sound card.
- Audio output device like speakers, headset or headphone is used for audio output sound from computer. The signals are sent to the speakers via the sound card that translates the digital sound back into analog signals. The audio response from the computer may be generated by synthesizing the input human speech to give audio output, or may be a result of a set of rules that are used to create artificial speech.

# Voice Response System



- Used to produce audio output.
- It produces audio output through a speaker by playing a selected sound sequence from a set of pre-recorded sound sequence.
- Voice response system are also used by automatic answering machine like telephone queries.
- Also used in foreign language teaching system can pronounce a word.
- **Speech Synthesizers** are Output devices having text-to speech conversion software.
- It converts information stored in a computer system in text format to spoken words or sentences by combining the basic sound units.

# Output Devices for Printing 3D Objects

## 3D Printers



# 3D Printers

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- 3D printer is used to generating output in the form of three dimensional solid objects from 3D digital files.
- The creation of a 3D printed object is achieved using additive processes.
- In an additive process an object is created by laying down successive layers of material until the object is created.
- Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

# 3D Printers

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# 3D Printers

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