EXPERIMENT 1

DATE:17/03/2022

AIM: To identyfy the major components of a computer system such as MotherboArd,RAM modules,Daughter Cards,Bus slots,SMPS,Internal storage devices and interfacing ports.

COMPUTER HARDWARES

Hardware represents the physical and tangible components of a computer, i.e. the components that can be seen and touched.

Examples of Hardware are the following −

- **Input devices** − keyboard, mouse, etc.
- **Output devices** − printer, monitor, etc.
- **Secondary storage devices** − Hard disk, CD, DVD, etc.
- **Internal components** − CPU, motherboard, RAM, etc.

INPUT DEVICES:

input device is a piece of equipment used to provide data and control signals to an information processing system, such as a computer or information appliance. Examples of input devices include keyboards, mouse, scanners, cameras, joysticks, and microphones.

- Mouse
- Joy Stick
- Light pen
- Keyboard

Mouse

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.

Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.

Joystick

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

Light Pen

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.

Keyboard

Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

OUTPUT DEVICES:

The output device displays the result of the processing of raw data that is entered in the computer through an input device. There are a number of output devices that display output in different ways such as text, images, hard copies, and audio or video.

- Monitor
- Printer
- Projecter

The monitor is the display unit or screen of the computer. It is the main output device that displays the processed data or information as text, images, audio or video.

Monitor:

i) CRT Monitor

CRT monitors are based on the cathode ray tubes. They are like vacuum tubes which produce images in the form of video signals. Cathode rays tube produces a beam of electrons through electron guns that strike on the inner phosphorescent surface of the screen to produce images on the screen. The monitor contains millions of phosphorus dots of red, green and blue color. These dots start to glow when struck by electron beams and this phenomenon is called cathodoluminescence.

ii) 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. An LCD screen comprises two layers of polarized glass with a liquid crystal solution between them. When the light passes through the first layer, an electric current aligns the liquids crystals. The aligned liquid crystals allow a varying level of light to pass through the second layer to create images on the screen.

iii) LED monitor

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 LEDsto backlight the display, whereas 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.

iv)Plasma Monitor

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. When voltage is applied, the gas in the cells turns into a plasma and emits ultraviolet light that creates images on the screen, i.e., the screen is illuminated by a tiny bit of plasma, a charged gas. Plasma displays are brighter than liquid crystal displays (LCD) and also offer a wide viewing angle than an LCD.

Printer:

A printer produces hard copies of the processed data. It enables the user, to print images, text or any other information onto the paper.

Based on the printing mechanism, the printers are of two types: Impact Printers and Non-impact Printers.

Impact Printer

The impact printer uses a hammer or print head to print the character or images onto the paper. The hammer or print head strikes or presses an ink ribbon against the paper to print characters and images.

Non-Impact Printer:

Non-impact printers don't print characters or images by striking a print head or hammer on the ink ribbon placed against the paper. They print characters and images without direct physical contact between the paper and the printing machinery. These printers can print a complete page at a time, so

they are also known as page printers. The common types of non-impact printers are Laser printer and Inkjet printer:

Projector:

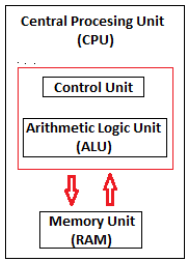
A projector is an output device that enables the user to project the output onto a large surface such as a big screen or wall. It can be connected to a computer and similar devices to project their output onto a screen. It uses light and lenses to produce magnified texts, images, and videos. So, it is an ideal output device to give presentations or to teach a large number of people.

PROCESSING UNIT:

A Central Processing Unit is also called a processor, central processor, or microprocessor. It carries out all the important functions of a computer. It receives instructions from both the hardware and active software and produces output accordingly. It stores all important programs like operating systems and application software. CPU also helps Input and output devices to communicate with each other. Owing to these features of CPU, it is often referred to as the brain of the computer.

Generally, a CPU has three components:

- ALU (Arithmetic Logic Unit)
- Control Unit
- Memory or Storage Unit

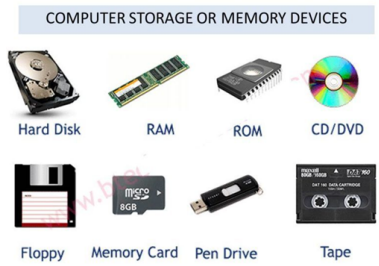


STORAGE UNIT:

Storage capacity is no longer dependent on the physical capacity of your computer. Many options exist to hold your files while saving storage space on your computer, phone, or tablet. If your devices are slow and running out of space, you can offload files onto a physical storage device

We have lots of storage units;

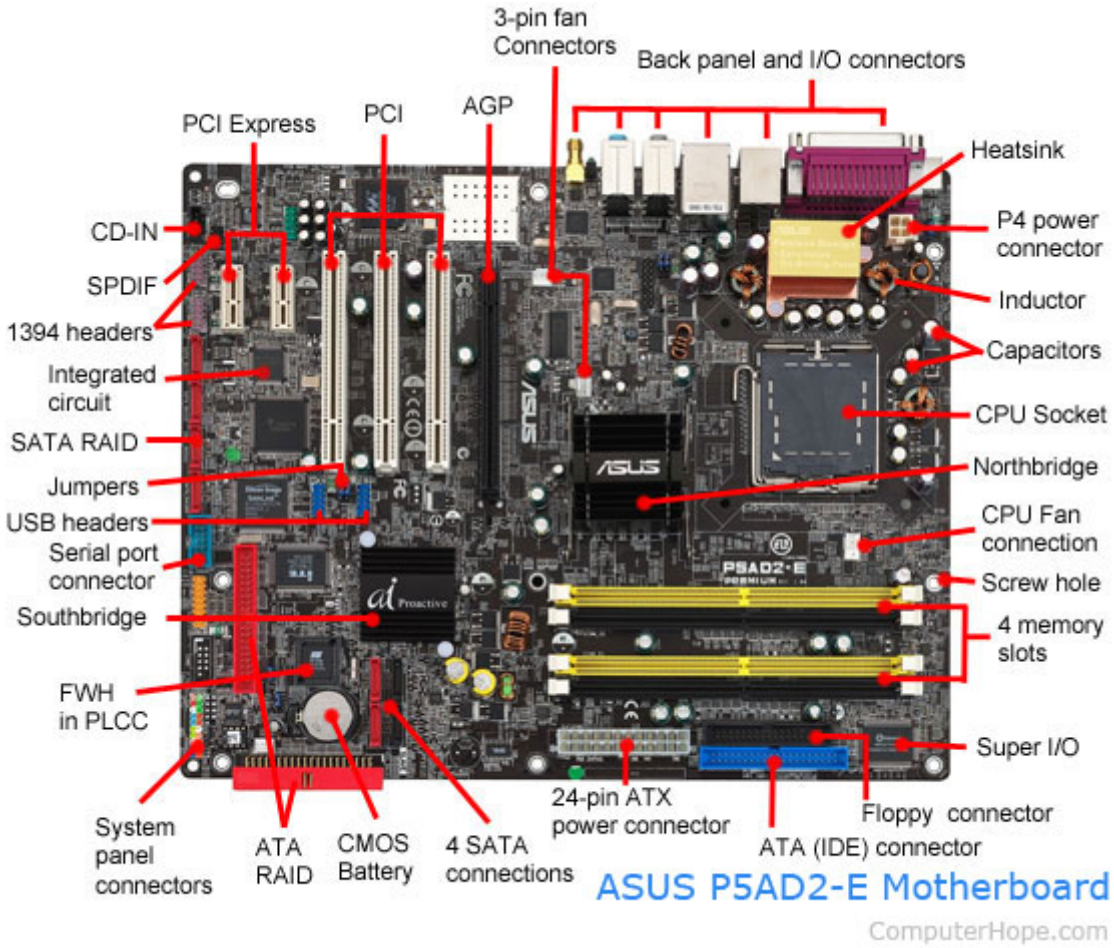
i)Internal Storage Unit
ii)External Storage Unit



MOTHERBOARD:

A **motherboard** (also called **mainboard**, main **circuit board**, or **mobo**) is the main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals. Unlike a backplane, a motherboard usually contains significant sub-systems, such as the central processor, the chipset's input/output and memory controllers, interface connectors, and other components integrated for general use.

A motherboard provides the electrical connections by which the other components of the system communicate. Unlike a backplane, it also contains the central processing unit and hosts other subsystems and devices.



RAM MODULES:

In computing, a memory module or RAM (random-access memory) stick is a printed circuit board on which memory integrated circuits are mounted.[1] Memory modules permit easy installation and replacement in electronic systems, especially computers such as personal computers, workstations, and servers. The first memory modules were proprietary designs that were specific to a model of computer from a specific manufacturer. Later, memory modules were standardized by organizations such as JEDEC and could be used in any system designed to use them.

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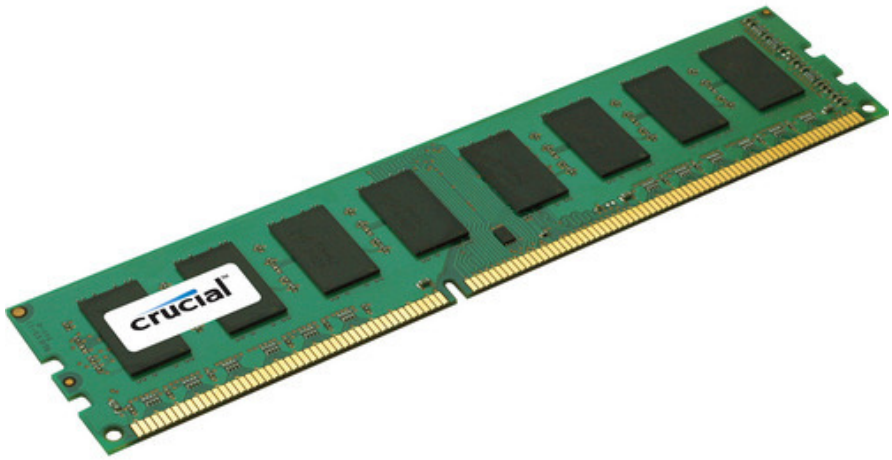
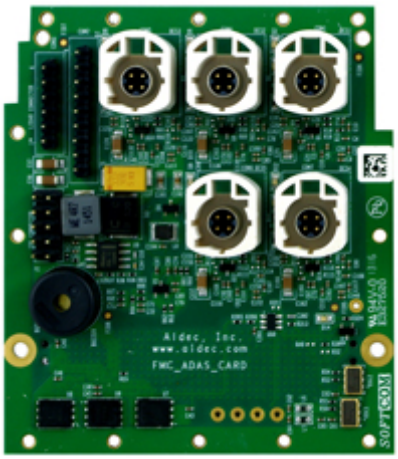


DAUGHTER CARDS:

Daughter cards provide extensions to HES or TySOM boards providing additional devices and peripherals not included in these boards. Due to using non-proprietary connectors like FMC or BPX the daughter cards can be reused across different hardware platforms.

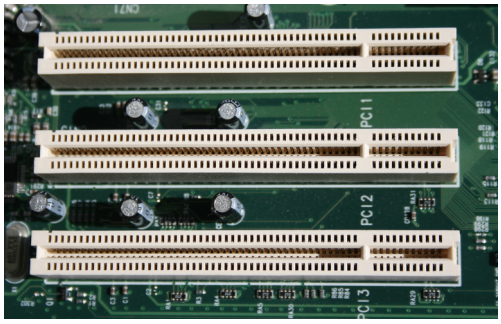


BUS SLOTS:

Alternatively known as a bus slot or expansion port, an expansion slot is **a connection or port inside a computer on the motherboard or riser card**. It provides an installation point for a hardware expansion card to be connected.

Computers have expansion slots to give the user the ability to add new devices to their computer. For example, a computer gamer may upgrade their video card to get better performance in their games. An expansion slot allows them to remove the old video card and add a new video card without replacing the motherboard

Today, the most commonly used expansion slot used and found on computer motherboards is the PCI Express expansion slot.



SMPS:

A switched-mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies, and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state.

Switching power supplies have high efficiency and are widely used in a variety of electronic equipment, including computers and other sensitive equipment requiring stable and efficient power supply.

A switched-mode power supply is also known as a switch-mode power supply or switching-mode power supply.

Switched-mode power supplies are classified according to the type of input and output voltages. The four major categories are:

- AC to DC
- DC to DC
- DC to AC
- AC to AC

INTERNAL STORAGE DEVICES:

Internal storage is a description of any storage device that's internal (inside the case) and is not a removable storage or external storage. For example, the hard drive inside your computer is an example of internal storage.

Storage is not only necessary for saving files, but also for running tasks and applications. Any file you create or save on your computer saves to your computer's storage device. This storage device also stores any applications and your computer operating system.

As technology has advanced over time, data storage devices have also evolved in a major way. Nowadays, storage devices come in many shapes and sizes, and there are a few different types of storage device that cater to different devices and functions.

A storage device is also known as a storage medium or storage media. Digital storage is measured in megabytes (MB), gigabytes (GB), and, these days, terabytes (TB).

Some computer storage devices are able to hold information permanently while others can only hold information temporarily. Every computer has both primary and secondary storage, with primary storage acting as a computer's short-term memory, and secondary as a computer's long-term memory.

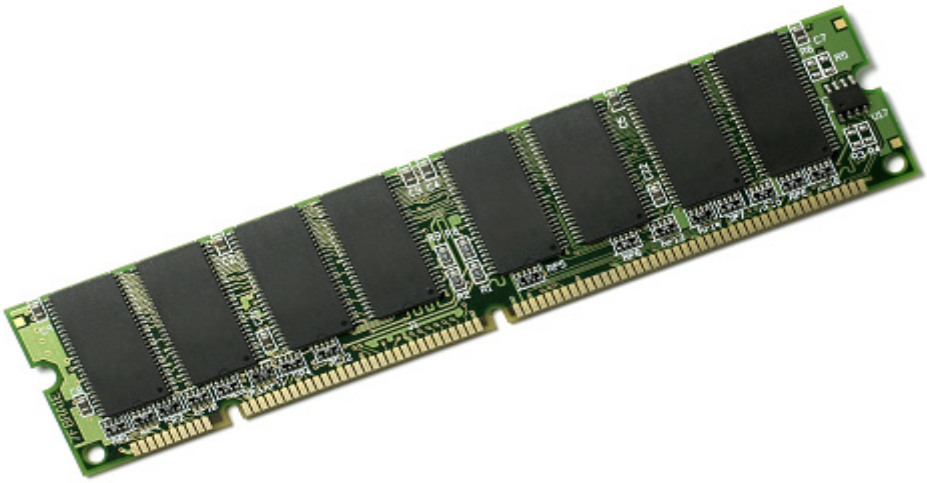
Primary Storage: Random Access Memory (RAM)

Random Access Memory, or RAM, is the primary storage of a computer.

When you're working on a file on your computer, it will temporarily store data in your RAM. RAM allows you to perform everyday tasks like opening applications, loading webpages, editing a document or playing games. It also allows you to jump from one task to another without losing your progress. In essence, the larger the RAM of your computer, the smoother and quicker it is for you to multitask.

RAM is a volatile memory, meaning it cannot hold onto information once the system turns off. For example, if you copy a block of text, restart your computer, and then attempt to paste that block of text into a document, you'll find that your computer has forgotten the copied text. This is because it was only stored temporarily in your RAM.

RAM makes it possible for a computer to access data in a random order, and thus reads and writes much faster than a computer's secondary storage.



Secondary Storage: Hard Disk Drives (HDD) & Solid-State Drives (SSD)

In addition to RAM, every computer also has another storage drive that's used for storing information on a long-term basis. This is secondary storage. Any file you create or download saves to the computer's secondary storage. There are two types of storage device used as secondary storage in computers: HDD and SSD. While HDDs are the more traditional of the two, SSDs are fast overtaking HDD as the preferred tech for secondary storage.

Secondary storage devices are often removable, so you can replace or upgrade your computer's storage, or move your storage drive to a different computer. There are notable exceptions, like MacBooks, which don't offer removable storage.

Hard Disk Drives (HDD)

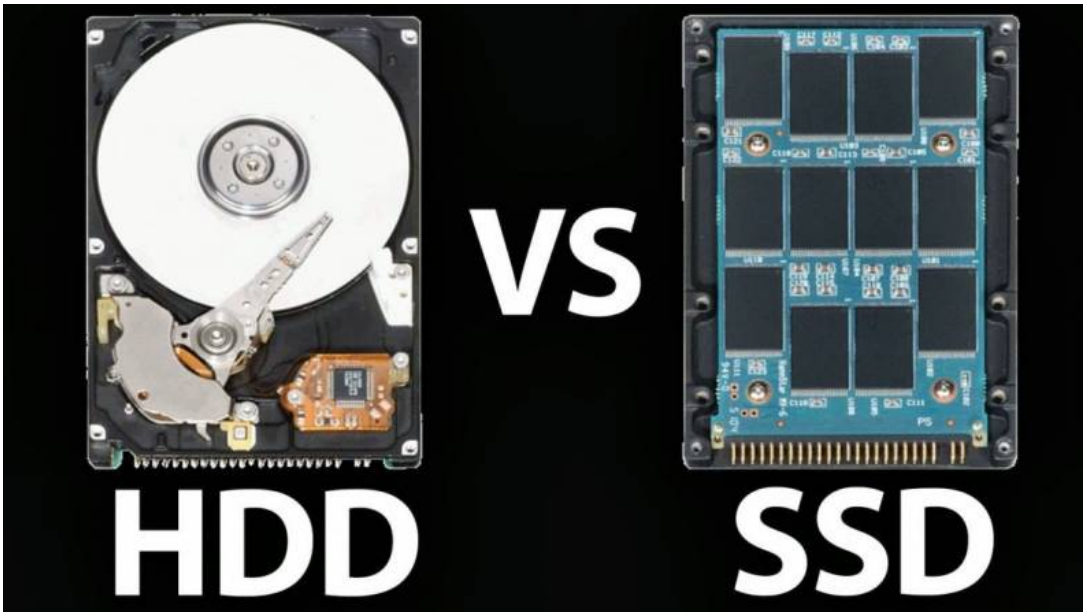
The hard disk drive (HDD) is the original hard drive. These are magnetic storage devices that have been around since the 1950s, though they've evolved over time.

A hard disk drive is comprised of a stack of spinning metal disks known as platters. Each spinning disk has trillions of tiny fragments that can be magnetized in order to represent bits (1s and 0s in binary code). An actuator arm with a read/write head scans the spinning platters and magnetizes fragments in order to write digital information onto the HDD, or detects magnetic charges to read information from it.

HDDs are used for TV recorders, servers, and laptop and PC storage.Solid-State Drives (SSD)

Solid-state drives emerged far more recently, in the '90s. SSDs don't rely on magnets and disks, instead they use a type of flash memory called NAND. In an SSD, semiconductors store information by changing the electrical current of circuits contained within the drive. This means that unlike HDDs, SSDs don't require moving parts to operate.

Because of this, SSDs not only work faster and smoother than HDDs (HDDs take longer to gather information due to the mechanical nature of their platters and heads), they also generally last longer than HDDs (with so many intricate moving parts, HDDs are vulnerable to damage and wear).Outside of newer PCs and high-end laptops, you can find SSDs in smartphones, tablets, and sometimes video cameras.



6.INTERFACING PORT

A port is a connection or a jack provided on a computer to connect external or peripheral devices to the computer, for example, you will need a port on your device to connect a keyboard, mouse, pen-drives, etc. So, it acts as an interface or a point of attachment between **computer**

and external devices. It is also called a communication port, as it is the point where you plug in a peripheral device to allow data transfer or communication between the device and computer. Generally, they are four to six in number and present on the back or sides of the computer.

Based on the type of protocol used for communication, computer ports can be of two types: Serial Ports and Parallel Ports.

Serial Port:

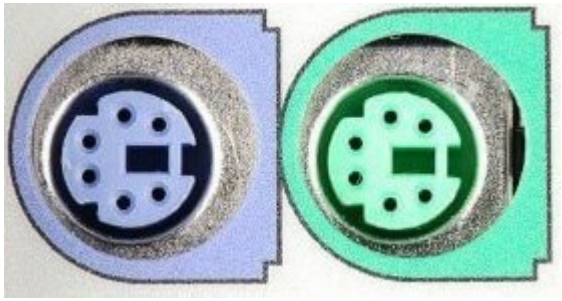
This type of ports provides an interface to connect to peripheral devices using a serial protocol. In this port, the rate of transmission of data is one bit at a time through a single communication line. For example, D-Subminiature or D-sub connector is a commonly used serial port, which carries RS-232 signals.

Parallel Port:

As the name suggests, a parallel port is an interface that allows communication or data transfer between a computer and a device in a parallel manner through more than one communication line. For example, a printer port is a parallel port.

Examples of Computer Ports:

1) PS/2:



As the name suggests, it was introduced with IBM's Personal Systems/2 series of computers. These connectors are colour coded, e.g., green was for mouse, and purple was for the keyboard. Besides this, it is a DIN connector with six pins. At present, it is superseded by USB ports.

2) VGA Port:

This port is commonly found in computers, projectors, and high definition TVs. It is a D-sub connector called DR-15 as it has 15 pins, which are arranged in 3 rows with five pins in each row. It was most often used to connect CPU
with CRT monitors. Still, most of the LCD
and LED
monitors come with VGA
ports. However, these ports don't assure high picture quality as VGA can carry only analogue video signals up to a resolution of 648X480.

As the demand and emphasis on video quality kept growing, the VGA ports were gradually replaced by more advanced ports that can assure high video quality such as HDMI
and Display Ports.

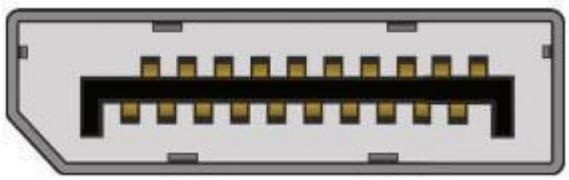
3) Digital Video Interface (DVI):

It is another interface between a CPU
and a monitor. It is a high-speed interface that is developed to transmit the lossless digital video signals and to replace analogue digital video signal transmission through VGA technology.

The DVI interface can be of three types based on the signals transmitted by it: DVI-I, DVI-D, and DVI-A. The DVI-I supports combined digital and analogue signals, whereas DVI-A supports only analogue signals, and DVI-D supports only digital signals.

Mini-DVI: As the name suggests, it is smaller than a commonly used DVI port. It is a 32 pin port developed by Apple as a substitute to Mini-VGA port. It can transmit various types of signals such as S-Video, VGA, and composite signals using respective adapters.

4) Display Port:



This interface allows transmitting a video and audio from a device to a display screen. It is an advanced display technology that is developed as a substitute for older interfaces such as DVI and VGA. A display port can be seen on laptops, desktops computers, tablets, monitors, etc. It has a 20-pin connector and offers a better resolution than DVI port.

5) RCA Connector:

It is designed to accept composite video and stereo signals transmitted by three cables called RCA cable. A RAC cable has three color-coded plugs that are connected to the three corresponding coloured jacks of an RCA connector. Each of the coloured jack is ringed with metal. The red jack supports the right stereo channel, and the white one supports the left stereo channel, while the yellow is used for composite video.

6) Component Video:

This interface allows splitting video signals into three channels. The component video generally has three color-coded slots; Red, Blue, and Green. Each slot receives and then transmits a particular component of the video signal. It offers high-quality videos than composite video and can carry both analogue and digital video signals.

7) HDMI port:

HDMI (High Definition Media Interface) is a digital interface developed to connect high definition devices such as digital cameras, gaming consoles, etc., to computers and TVs with HDMI ports. Besides this, it can carry uncompressed video and uncompressed or compressed audio signals. The advanced version of HDMI, such as 2.0, can transfer video signals of up to a resolution of 4096x2160.

8) USB:

USB
(Universal Serial Bus) port is very versatile in use; It can be used for various purposes, such as to transfer data, to connect peripheral devices, and even as an interface for charging devices such as smartphones, digital cameras, etc. Today, it has replaced PS/2 connectors, game ports, serial and parallel ports, etc.

Types of USB ports:

USB Type A:

It is a four-pin connector and has many versions that include USB 1.1, USB 2.0 and USB 3.0, and USB 3.1. Version 3.0 is a common standard that supports a data transfer rate of upto 400 MBps . Version 3.1 allows a data rate of upto 10 Gbps.

USB Type C:

It is the latest design of the USB that comes with 24 pins and can handle a current of 3A. As it can handle high current, it is also used in devices for fast charging. This port was developed by the USB Implementers Forum (USB-IF). One of the distinguishing features of this port is that it has no up or down orientation, which means you don't need to flip the male connecter over to plug it in the USB port. For example, a USB-C plug is symmetrical, so that it can be inserted or plugged in either way.

9) RJ-45:

It is an Ethernet style network port found on the computer and other devices such as routers, switches, etc. This port allows your computer to interact or communicate with other computers and networking devices where Ethernet networking is required.

10) RJ11:

It is also a registered jack, which is often used as an interface for modem, ADSL, and telephone and for terminating the telephone wires. Although it looks like RJ45, it is different from that as it is smaller and has only six pins; it is a 6P4C connector that shows it has six pins with four contacts. This port is mainly used to connect to dial-up modems and is also known as a phone connector, modem port, phone jack, etc.

11) 3.5 mm Audio Jack:

It is a small round connector, port, or an audio jack commonly found on laptops, computers, phones, etc. It is designed to connect to wired headphones and speakers. In other words, it accepts a pin-shaped plug from a headphone, earphone, etc. The measurement "3.5 mm" denotes the diameter of the connector.

However, in older devices, there were two audio jacks, one for mic and another one for headphone. Besides this, they have a 2.5 mm jack or port for phone headphones.