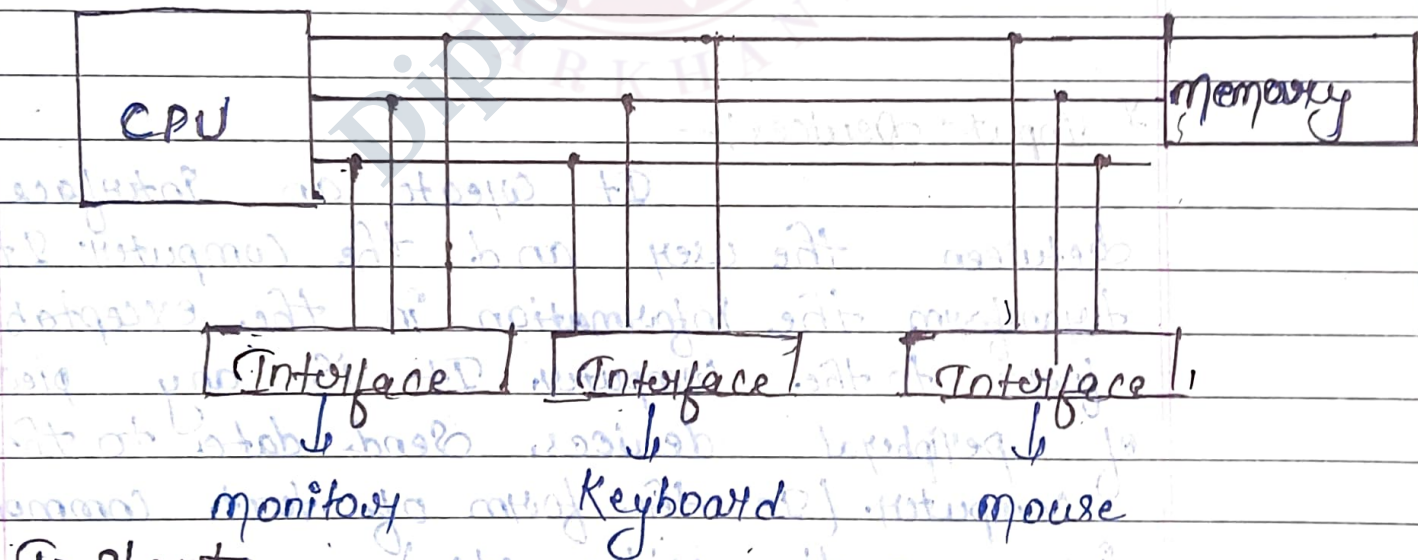
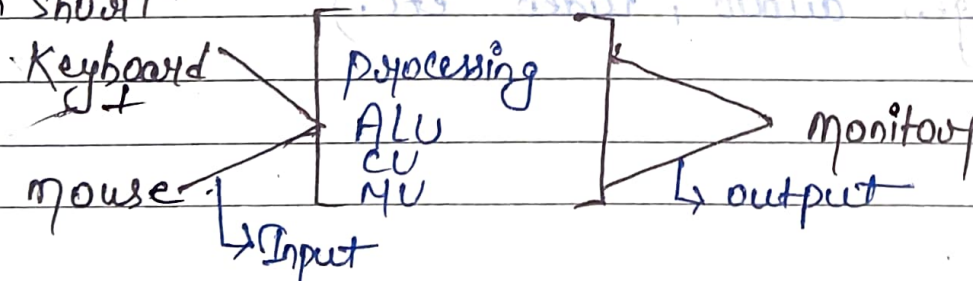


Input output Interface:-

* It is used help in transferring the information between the Internal storage device that is memory and external peripheral devices. The peripheral devices is a device which provide input and output for the computer for example * Keyboard and * Mouse provide input to the computer (input device), * monitor and * printer gives a output (output device). Some other peripheral device like External flex drive which provide both input and output.



In Short





Function of input, output interface

- i) It is capable of providing ^{signal} single like control signal, store signal.
- ii) It also contain error detection.
- iii) It also convert digital data into analog data and vice-versa.

Input Device and output Device

* Input Devices:-

It create an interface between the user and the computer. It transform the information in the acceptable form to the computer. It is any piece of peripheral devices, send data to the computer. (In the form of text, common image, audio, video etc.)

Output devices:-

It is the device in which user receives the information from the computer. This data is used to display information to the user in any other form.

Types of computer ports:-

ports are a connector b/w the external and internal input output device using cables. It allows to communicate between the external devices with the laptop and the computer.

→ There are two types of ports:-

i) Internal port:-

It is used to connect internal device like ~~CD drive~~ CD device, disc, other internal device with the motherboard.

ii) External port:-

It is used to connect modem, mouse, printer, flash drives with the motherboard.

→ A ~~few~~ ^{few} important points:-

i) Serial ports:-

It is also a communication port they are generally used for the connection of external devices like mouse, keyboard etc. Serial cables are cheaper compared to parallel cables.

There are two version of serial ports

i) 09 pin serial port

ii) 25 pin serial port.

ii) parallel port :-

* It is used to connect the scanner and printer.

* It send and receive the several bits at same time.

* The Transfer of data or speed is higher.

iii) USB (universal Serial bus)

* It is used as to connect all kinds of external devices like Keyboard, mouse, printer, Scanner.

* Serial Connection.

* The data transfer rate in this is 12 megabits.

iv) PS/2 port

* It is used to connect Old Computer Keyboard and mouse.

* In previous computers the mouse connector look like this. PS/2.

v) VGA port:-

* VGA port stands for video graphic.

Array Connectors. It is used to connect the monitor to the computer video card.

* Serial Connector

vi) Firewire port:-

* used to transfer large amount of data at a very high speed.

* It is used in the video and camera process.

vii) Infrared port:-

* It is the wireless communication that is used to send or receive infrared signal to the other devices.

viii) Modem port:-

- It is used to connect computer modem to the telephone network.

ix) Digital video Interface (DVI):-

It is used to connect LCD monitor to the computer video graphics card.

x) Ethernet port:-

Ethernet port helps to connect to a network and a high-speed Internet (provided by LAN or other sources). It connects the network cable to a computer and resides in an Ethernet card. It provides a data transfer speed of 10 Mb to 1000 Mb (megabits) per second.

* It is used to connect users with LAN,

- and provide high speed internet.
- connects by using a network cable to a computer.

* What is electrical cable?

The cable that is used for the transmission and distribution of electrical power is known as the electrical power cable.

It is used for the transmission of high voltages in places where overhead lines are impractical to use.

The power cable is made of three main components, namely, conductor, dielectric, and sheath. The conducting path for the current in the cable is provided by the conductor.

The insulation or dielectric withstands the service voltage and isolates the live conductor with other objects.

The sheath does not allow the moistures to enter and protects the cables from all external influences like chemical or electrochemical attacks and fire.

* Cables are classified into 5 types depending upon their purpose as follows:

- Ribbon Electric cables

It consists of multiple insulated wires running parallel with one another and is used for transmission of multiple data simultaneously.

For Example:-

This is used to connect the CPU with the motherboard and is generally used for the interconnection of networking devices.

* Ribbon cables, essential in many electronics, offer efficient and reliable connection b/w component.

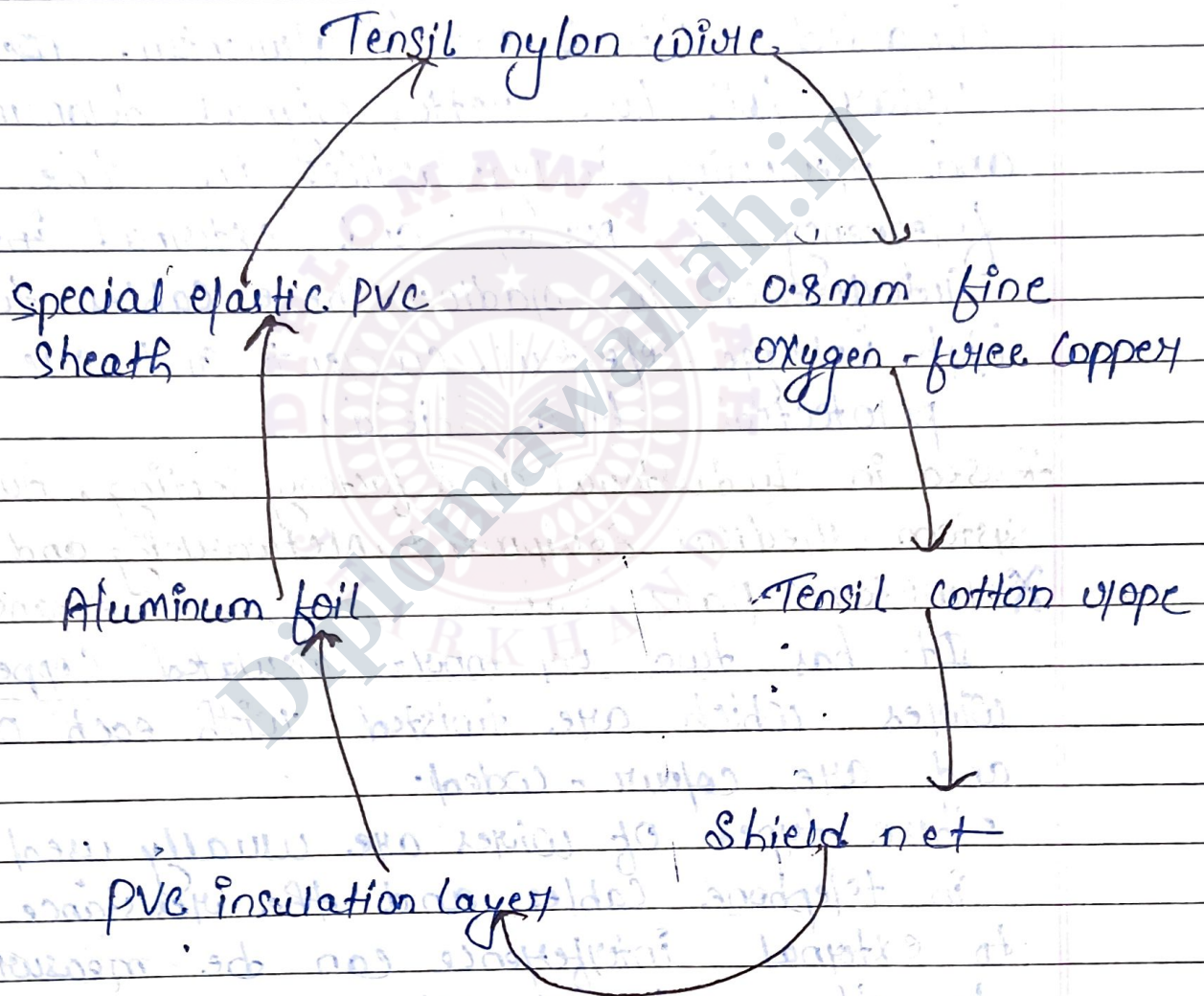
* proper handling and maintenance ensure their longevity and optimal performance.

* Ex - Connecting a laptop motherboard to keyboard or display.

10mm

Structure analysis.

Reason for bending resistance.



Rudgeress- heat transfer on receive.

• Shielded Cables

It consist of 1 or 2 insulated wires which are covered by a woven braided shield or aluminium or Mylar foil for better signal transmission and removing irregularities in the frequency of power and external interference in radio. These cables transmit high voltage electric current and are protected by a shield.

* used in Industrial and factory setting, Audio video system, medical equipment, Networking and data

* Twisted Pair Cables

It has two or more insulated copper wires which are twisted with each other and are colour-coded.

These types of wires are usually used in telephone cables and the resistance to external interference can be measured by the number of wires.

* Reduces electromagnetic interference (EMI)

purpose

Reducing interferences

Transmitting data and voice

Cost-effective Networking

Application

Smart cities

5G and Beyond

Edge Computing (Support data traffic in edge data centers)

* Coaxial Cables

This consist of solid copper or steel conductor plated with copper which is enclosed in the metallic braid and metallic tape. This is entirely covered with an insulated protective outer jacket.

These types of cables are used for computer networking and audio-video networking.

* Fibre optics cable.

These are :

There are these types of cables which transport optical data signals from an attached light source to the receiving device.

We are pretty much aware of what is optical fibre and its uses in a wide variety of application.

* HDMI (High Definition Multimedia Interface)

* USB (universal Serial Bus)

HDMI and USB are two popular interface used for connecting device and peripheral with computers and other electronic devices. The fundamental difference b/w HDMI and USB is that USB (Universal Serial Bus) is an interface designed for data transfer, while HDMI is designed for transferring high-quality audio and video signals.

Difference between HDMI and USB.

parameter	HDMI	USB
Full-Form	HDMI is an acronym for High-Definition Multimedia Interface.	USB is an acronym for Universal Serial Bus.
main objective	* HDMI is mainly designed for transferring high-quality audio and video signals.	* USB is mainly designed to transfer data b/w a computer and peripheral devices.

Speed * HDMI transfer signals at a faster speed than USB, a slower speed.

Resolution * HDMI supports higher resolution, audio and video resolution than HDMI.

Compatibility * HDMI is primarily compatible with display devices like TVs, monitors. * USB is compatible with a wide range of devices.

Maximum data transfer speed * HDMI 2.1 provides a maximum data transfer speed of 48 Gbps. * USB 3.2 Gen 2 x 2 provides a maximum data transfer speed of 20 Gbps.

Cost * HDMI is more costly than USB. * USB is relatively less expensive.

Connectivity * HDMI Connector has a larger rectangular shape and specialized design. * USB Connector smaller size and less specialized design.

Power * HDMI can provide power to connected devices. * USB can provide power to connected device.

Types * It has several types like mini HDMI and Standard HDMI, micro HDMI. * It has also several types Type-A USB, Type-B USB and Type-C USB.

* Application of Serial port

* For managing and configuring networking equipment such as routers, switches, etc.

* present in barcode scanner.

* LED and LCD text displays.

* present in test and measuring equipment.

* updating firmware on various consumer devices.

* LCD and plasma use it to control screen function by external computers.

* present in CNC (Computer Numerical Control) Controller.

* Characteristics of Serial port

- usually, external modems use these ports.

- These ports have two available versions namely, the 9-pin and 25-pin models.

- Data through this port travels at the speed of 115 kilo-bits per second.

Serial port

* It performs serial transmission.

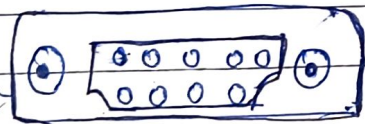
* The transmission speed is lesser than the parallel port.

* The number of wires is less.

* It transmits a single stream of data which means bit by bit transmission.

* Serial ports involve male ports.

* Devices using serial ports are mainly modems, connecting devices, controllers, security cameras, etc.



parallel port

* It performs parallel transmission.

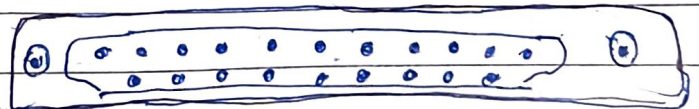
* The transmission speed is higher than the serial port.

* The number of wires is more as compared to the serial port.

* It can transmit multiple streams of data which means multiple bits transmission.

* parallel ports involve female ports.

* Devices using parallel ports are mainly printer, hard drives, zip drives, CD-ROM drives, etc.



* Advantages of Application of parallel ports.

- * parallel ports commonly used for connecting printers to computer system.
- * This port were utilized for connecting outside devices including tape drives, ZIP drives, and external tough disks drives.

* Data Acquisition and Control.

* Advantages

- High data transfer rate.
- Simplicity and low cost
- Versatility
- power supply
- Improved Data Integrity

* Disadvantages

- Cable length limitation
- limited Speed and Bandwidth
- Complexity of Configuration
- Resources Intensive
- Limited Device Support

Q What do you mean by motherboard?

* Motherboard is a device or a circuit board ~~at~~ ^{which} inside general purpose computing system, including personal computer, smart television, monitors with support the communication between different electrical component such as CPU, memory.

* It is made up of fibre glass and copper.

* It distribute the electricity and communicate between the CPU, RAM and other computer component.

* They are categorized using a form factor with ATX (Advance technology extended) being the most common among all industries.

The types of motherboard:-

i) ATX:-

It is the motherboard which is created by intel company 1993. It is more compact and enable the associated component to be interchanged and connected together. It uses advance technology.

ii) Extended ATX:- [EATX]

* This form of the motherboard, consist of 340 344 X 330 mm.

* It is used in workstation and server.

* Multiple PC or computer joined together.

Note:- It is used in AI technology, server management, 3D model.

iii) Micro ATX:-

- * They are used in general purpose computing.
- * When very few computers joined together (one or two).
- * They are used in home or office computers.

iv) Mini ATX:-

- * They are more compact, reduce the power consumption and quicker cooling capacity capabilities.
- * Low level of fan noise.
- * It is used in home theater because it is the allrounder and enhance the overall performance of the system.

Mini ITX:- (Information technology extended)

- * It is developed in 2000.
- * It reduces the power consumption and basically used in computers with small factors.
- * It can be also an allrounder, more costly, enhances the computer system.
- Ex- used in movie theater, 3D modelling, IoT etc.

aviation - aircraft.

* SMPS (Switch mode power Supply)

It is a switch mode power supply. Sometimes referred as switcher, switched power supply. This power supply converts the electrical power while transferring the power from AC to DC.

* SMPS is a electronic device that converts the electrical power into DC output. They are used in many application:-

1) Computers:-

SMPS are used in computers to provide a stable and consistent voltage for the safe and efficient operation of the devices connected.

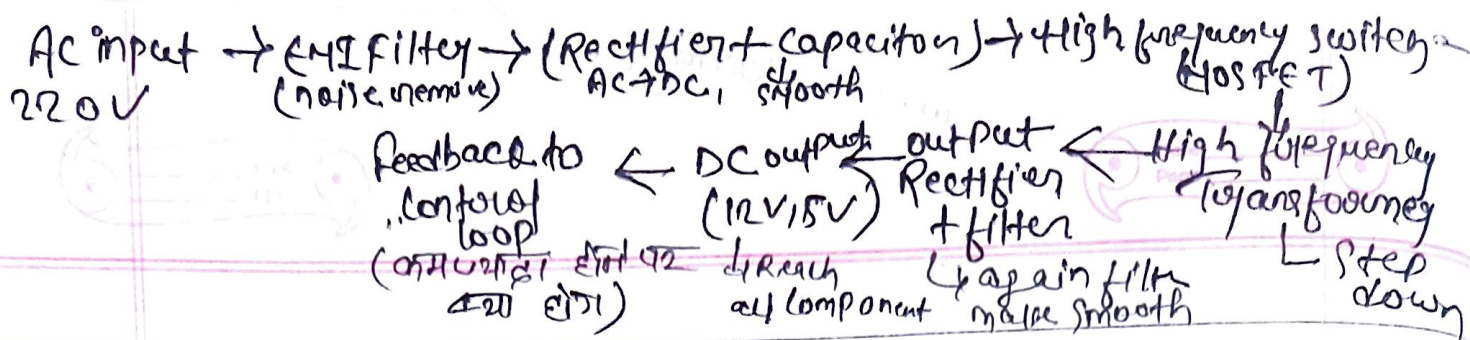
ii) Industrial application:-

They are used in Security System, machine tools, digital devices, aviation & marine and process and control automation system.

iii) pocket calculator:-

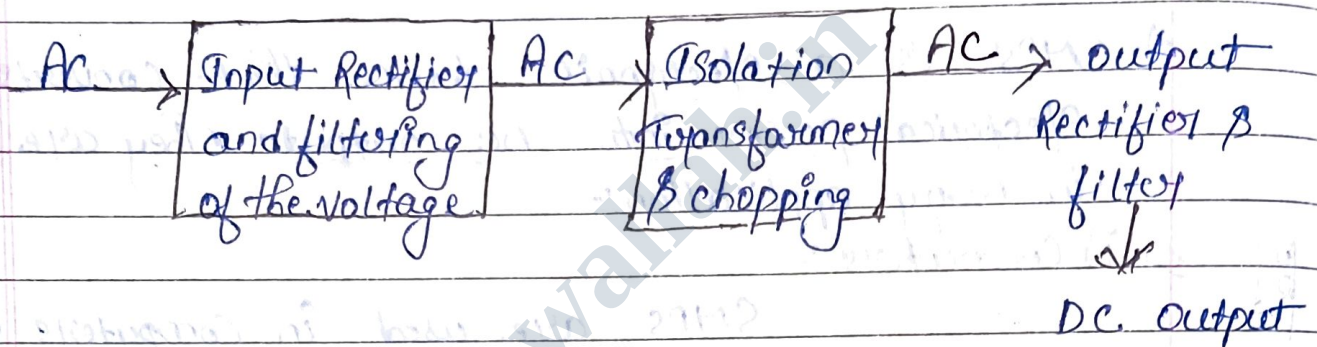
The designed SMPS are used for the pocket calculator.

* i) There are various advantages of using SMPS as they are at a high frequency which reduces energy loss and heat generation.



ii) SMPS are small and lighter.

* The working principal of SMPS:-



How the SMPS work on a computer device?

First of all, The SMPS converts the AC voltage into the DC voltage using a rectifier and a filter after that the alternative current breaks down into the DC voltage to create a series of high frequency square-wave pulses (using Chopper).

The SMPS will increase or decrease a voltage to main a constant output even if the load changes after that based upon the connected devices it gives the DC output.

Note:- The rectifier convert AC to DC. having very few steps, while SMPS also convert AC to DC but vice versa have more complicated steps as compare to rectifier to produce high frequency DC voltage.

* Power supply connectors

There are the few types of power connector we have to know while connecting a power supply.

i) ATX power connector:- It consist of 20+4 pin, also known as main power connector

ii) ATX 12 V power connector:- It is the 4+4 pin, also known as CPU power connector, P4 power connector. It connects to the motherboard, for most of the computer we need to connect single 4 pin connectors.

iii) SATA:- SATA also called as Serial ATA power cable. They are connect to the hard drives and SATA optical devices.

iv) Molex:- It is a 4 pin connector also called as device connector. It is used to connect to the computer fan, sometimes hard drive.

v) PCI:- It is a six pin also called as PCIe, PCIe connectors. It is used to connect to the graphics card. Graphics card require power supply, power consumption so this connector will help us.

* 5 volt Additional :-

They are given for the low power as a additional to the computer LAN system. even if the computer is off.

Mainly the output voltage are the conversion of AC to DC (115 volt to 230 volt) based upon your region using a SMPS. The DC voltage is regulated to the different levels of each output using transformers and voltage regulators.

This ensures stable and consistent power supply to each component after that the voltage distribution starts based upon the requirement.

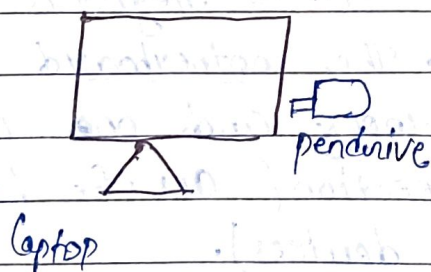
iii) Computer supported measurement Techniques

The computer are mainly use for to communicate with the other users as well as the internal communication. There are many ways to implement

this communication, it can be done with the serial port or USB ports using low level programming language whereas for the user like us we generally use high level language to communicate with the devices these languages can also use to manipulate the data and displaying display it. Some of the measurement which the computer uses is VISA (virtual instrument software architecture) - They are mainly use for to recognize the which devices are connected to the computer and communicate with them.

Programs which understand the VISA are connected to the computer and also communicate by sending the text strings to the devices. There is also one common format which is called. SCPI (Standard Command for Programmable Instruments) It is also used (It defines a syntax to control the devices).

Now a days a microprocessor are often used for to upload the program into the computer system.



microprocessor (inside the CPU)
↓
low level lang. high level lang.
load a ath =) C
load b
add. a+b
store. C
exit

VISA $\Rightarrow$ It's a API (application programming Interface) which help us to recognise which device (pendrive) get connected.

SCPI $\Rightarrow$ It is also API which either in high / low level language to control the device connected.

Q. Which device apply power to the various system component of the computer?

Ans. ①

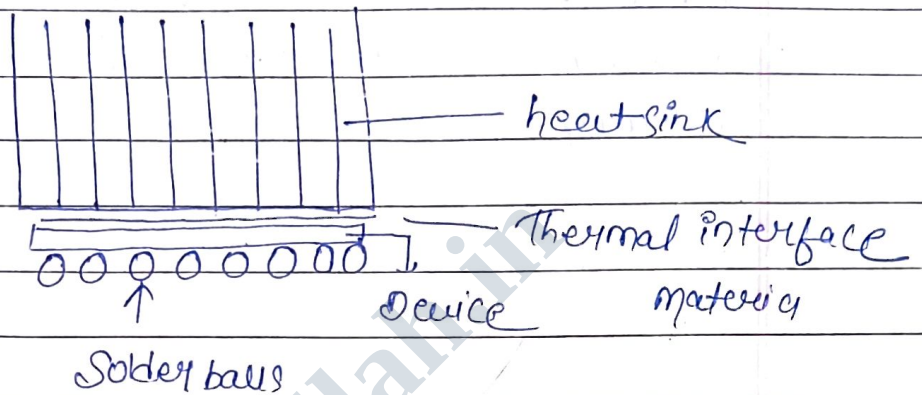
It consist of two answers:-

① SMPS:- Its main work is use to provide the DC & voltage to all the power supply, system component, fan.

② PSU:- The PSU (power supply unit) It is the component that provides the power to the internal components such as registers including the motherboard. The motherboard signal the PSU to turnoff and on when the devices need connection (all the harddrives and additional devices).

Q HeatSink :-

It looks like this,



A heatsink is used in electronic devices, to dissipate the heat and prevent overheating. It is made up of metal such as aluminium or copper. It absorb and transfer the heat from the CPU or other heat generating components. Basically, By increasing the surface area available for the heat transfer to increase the flow of air and ~~can~~ cool down the surface.

The device transfer the heat to the heatsink by the conduction. The heat transfer from the heatsink is done by the processes convection or sometime radiation.

Heatsink :-

i) Natural Convection through heat sink :-

when the heat is upto the level so that the device / CPU can

take it. so $\rightarrow$ no worries.

11) Forced Convection through heatsink:— When the movement of the heat is done by either fan or blower.

When electronic component operate $\xrightarrow{\text{generate}}$ heat due to the flow of electricity

overheating occurs

Thus the heatsink works by absorbing the heat &
 Surface area of heat sink $\uparrow$
 heat passes quickly $\uparrow$
 Time $\downarrow$
 Efficiency $\uparrow$

* heat sink $\rightarrow$ has a thermal interface material $\rightarrow$ this material will help to transfer the heat from the component to the heat sink.

Th.
 Component $\xrightarrow{\text{Transfer the heat}}$ Heat sink
 Thermal material attached

* Wattage Rating:-

The rating which is given to the device which specifies the maximum power which the device can safely handle.

What should you look for when choosing a power supply?

(PSU - power supply unit)?

Voltage:-

→ The first thing which we notice is voltage. Identify the voltage requirement your PSU will need to connect with the component. Find the Input and Output Voltage depending upon the computer. It must be a specified range up to 230 Volts.

→ Wattage:-

The wattage, the simply means how much the power supply a computer can handle with the heat generation and overheating and sometimes shutdown.

→ Location and space:- (i) The computer system needs the protection from the dust, moisture, extreme temperature, harmful radiation.

- ii) Ventilation & Cooling
- iii) power standard

* 80+ Rating System:-

80+ has been around since 2004. It is a voluntary certification program so that the industry design more efficient PSU. A power supply takes the AC voltage convert it into the DC voltage in which your PC component used to operate, all the PSU can't convert the all the energy or power into the DC voltage, some power may be loss as a heat.

There are 6 tier of power supply rating: (hardware)

- | | |
|----------------------|-----|
| i) 80 plus white | 80% |
| ii) 80 plus Bronze | 85% |
| iii) 80 plus Silver | 87% |
| iv) 80 plus Gold | 90% |
| v) 80 plus platinum | 92% |
| vi) 80 plus Titanium | 94% |

* Benefits of 80 plus rating power supply:-

- i) Energy saving on electricity.
- ii) less noise, less heat loss.
- iii) Environment friendly

iv) you can also upgrade your system if you want.

* PSU must have 80 percent efficiency in all the components, with the 20 percent, 50% as a heat loss may be the load. (That's why it has given the 80 plus). It is a certification of a PSU having 80% of power to the 20% of heat ratio.

* Modular power Supply:-

Basically the modular power supply is used to provide the or improve the air flow and cooling inside the CPU, cables it can also be used to make your CPU look neat and clean while accessing the wires.

make flexibility and customization option by letting you choose the type of cable you want. you can also troubleshoot and maintain the CPU by allowing you to isolate and replace the faulty cables.

* Disadvantage

- It is expensive as compare to non-modular failure many happens.

- potential risk of loose or damage pins.

* SMPS

* Symptoms of SMPS failure or common problems from the faulty SMPS:-

1. The power is not reaching the computer system. :- Sometimes because of the SMPS failure, or the power supply connection is not connected properly to the motherboard, due to such reasons @ SMPS fails.

2. Display comes to the monitor and then blackout :- It can also happen 2 to 3 times. Its solution is replace the SMPS, also the motherboard & the PC.

3. The PC power on but the computer monitor is not working :- Sometimes it happens check the VGA cable and the monitor connection. Also check the SMPS connection (voltage fluctuation).

4. The PC freeze or in a hang mode or reboot suddenly :- It can happen because of overheating of SMPS.

5. There is a whistling/squealing/motor like noise from the SMPS when the PC starts - either the SMPS fan has a fault or the full SMPS is at fault.

* Troubleshooting power supply

There are something you can check when troubleshooting a power supply:-

i) power input:- you have to look into whether the correct power supply is being received by the PC or not.

ii) power buttons:- Check whether there any physical damage or any issue related to the power supply/button.

iii) Overheating:- A warm power supply is normal. Sometimes, too much heat may indicate a problem.

iv) visual inspection:- Look for the sign of damage in the CPU or any cable connected to it.

v) Software trouble:- Sometimes not the hardware is at fault the software is a main problem. Operating system is not working properly.