Experiment Name: Identification of Computer Hardware and its Components

Object:

1. Indentifying Personal Computer Mother Board
2. Indentifying Personal Computer Power Supply
3. Indentifying SATA Ports & Cables
4. Indentifying Serial, USB Ports & Cables
5. Indentifying LAN card (Ethernet Card) & Connectors

Introduction:

Computer is a versatile, diligent machine that operates on a set of instructions and is capable of handling large volumes of data at tremendous speeds with a high degree of accuracy, ensuring timely, accurate and easy to access information.

Today Computer has become a part and parcel of almost everybody's life. The reason for its popularity is that its uses are varied, it can be modified to do anything that human imagination can make it do and hence its reach is expanding day by day.

It's a machine that helps in mechanisation of various fields of human activities. It performs arithmetic, numeric, alphabetic data operations at very high speed with high accuracy & reliability.

The computer evolution is described in terms of generations, namely

First Generation Computers (1946-54): These computers were large in size & they were using Vacuum tubes, magnetic drum memory, Assembly language programming, produced lot of heat, processing speed is very slow.

Second generation Computers (1955-64): These computers were using Transistors, magnetic tapes & disks, they were using compilers and processing speed was moderate.

Third generation Computers (1965-74): These computers were using ICs like IBM 360, small in size; high speed processing & Operating system was introduced

Fourth generation Computers (1975 onwards): These computers were using VLSI technology and they were using semiconductor memory, High end Operating systems with virtual memory and processing speed in micro & nano seconds.

Fifth generation Computers: These computers use artificial Intelligence, like robotic technology.

Based on their data handling / data processing capacity computers are classified into various categories like
1. Personal Computers
    a. Handheld Computers
    b. Laptop Computers
    c. Desktop Computers
2. Mini Computers
3. Mainframe Computers

Mini Computers and Mainframe Computers are used as Servers

The Computer or PC is a combination of two things.
1. Software
    a. System Software (or) Operating system
    b. Application Software

2. Hard ware
    a. CPU (this CPU box consists of)
        i. Mother Board
            a) Processor (P4, dual core, i3, i5 & i7 etc.)
            b) Random access memory (RDRAM, SDRAM, DDR, DDR3 etc.)
            c) Cache memory (SRAM, Internal & External Cache memory)
            d) BIOS (ROM BIOS & CMOS)
            e) Expansion Slots (ISA,PCI)
            f) Ports (Serial, USB, HDMI)
        ii. Disk Drives
            a) Hard disk drives (250, 500 GB, 1 TB etc.)
            b) CD drives (CDR, Combo, Blue Ray etc.)
        iii. Add-on cards
            a) Display card
            b) Sound card
            c) NIC card
            d) Graphic Card
        iv. Power Supply Unit
            a) SMPS based
                a. AT supply
                b. ATX supply
    b. Monitor
        i. CRT monitor
        ii. TFTP monitor
        iii. Plasma monitor
        iv. LED monitors

    c. Keyboard
        i. Wired key boards
        ii. Wireless key boards

    d. Mouse
        i. PS2 mouse
        ii. Optical Mouse
            a) Wired
            b) Wireless

Computer Switching (ON) process:

1. POST (Power On Self Test):
   As soon as computer is powered it will do the self test there by it ensures the minimum required devices are working

2. Boot-strap:
   It is a process of loading of Operating System (OS) from hard disk onto the RAM.

3. ISR (Interrupt Service Routines)
   The computer will obey the instructions or commands given by the user in the form of interrupt service routines.

After studying various components of personal computers, now we recognize and identity the different computer hardware components.
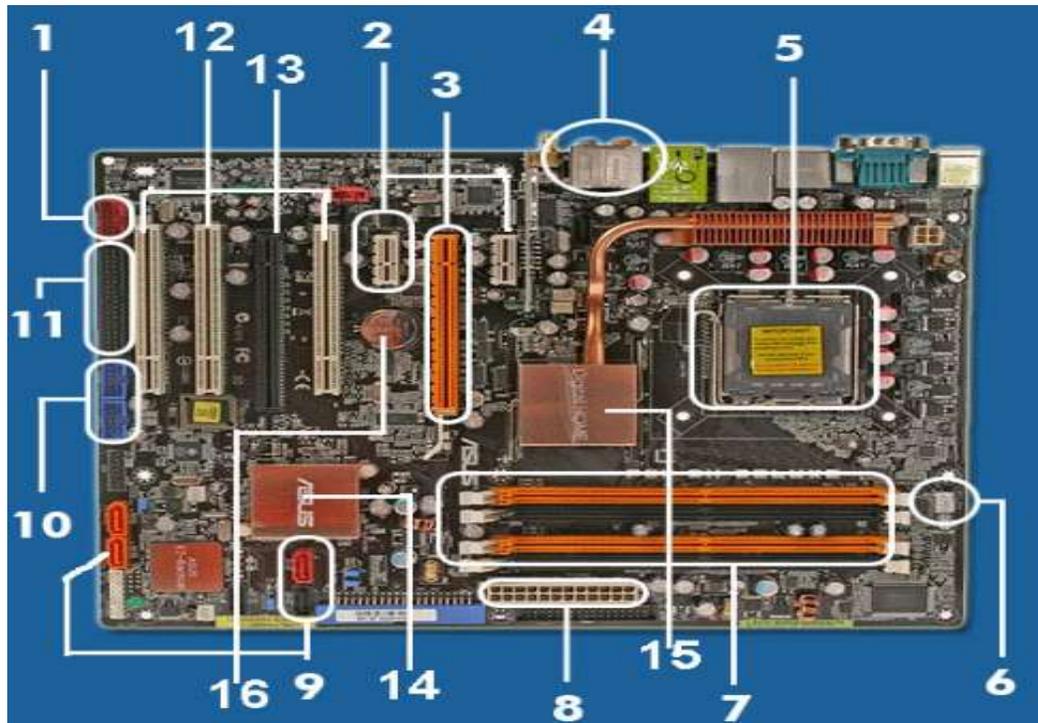
1. **ACTIVITY NAME: INDENTIFYING PERSONAL COMPUTER MOTHER BOARD**

OBJECTIVE

On completion of this activity you will be able to Recognize Personal Computer Mother Board and Its Components

ACTIVITY
Disassemble the Personal Computer & Observe the various components of mother board.

1. **Firewire Ports:** Firewire (IEEE 1394B) supports 800Mb/s for high speed transfers to external video cameras and external disk drives.

2. **PCIe x1 (Peripheral Component Interconnect express):** supports accessory cards such as wireless adapters and TV-tuners. (This board has got 2 such cards)

3. **PCIe x16 (Peripheral Component Interconnect express):** supports the latest graphics cards. Many motherboards have 2 or more PCIe x16 slots to support running two graphics cards simultaneously.

4. **Integrated Audio Connection:** Most motherboards have integrated sound audio.

5. **CPU Socket:** This is where the brains of the computer, the CPU, Central Processing Unit plug in.

6. **Fan Headers:** Many components radiate heat to the motherboard. It is important to have a motherboard with many fan headers to allow more system fans. 2 pin headers provide simple power, while 3 pin headers provide power as well as bios controlled speed and smart control.

7. **Memory:** Most motherboards support dual-channel architecture, DDR (Dual Data Rate), DDR2 or DDR3. By installing memory modules into matching banks, it is possible to double the speed that date moves from RAM to the CPU.

8. **ATX Power: (Advance Technology Extended)** this is where ATX power is connected to the power supply with 20+4 pins.

9. **SATA (Serial Advanced Technology Attachment):** SATA has many advantages including slim, flexible cables and a simplistic serial link. All current motherboards have SATA to support the latest hard drives as well as optical drives. (This motherboard has got 4 such SATA interfaces)

10. **USB Headers:** The total number of USB ports on a computer can only be accessed using the internal USB headers. Every internal USB header can support two additional full speed USB ports.

11. **EIDE: (Enhanced Integrated Device Electronics)** This is where ATA100/133 hard drives and CD and DVD optical drives connect if they are the EIDE type.

12. **PCI Slots: (Peripheral Component Interconnect)** these are expansion slots where various cards plug in. These may include modems, network cards and others that add features to the computer.

13. **AGP Slot (Accelerated Graphics Port):** AGP is a high-speed point-to-point channel for attaching a graphics card primarily to assist in the acceleration of 3D computer graphics. Since 2004, AGP is being phased out in favour of PCI Express (PCIe).

14. **Integrated Audio Chip**: The computer's sound system is often integrated into the motherboard. When this is done, the components for it are on the motherboard.

15. **Integrated Video Chip**: The video system can also be integrated into the motherboard. This is usually the case on most computers that are not specifically designed for games and other intensive video requirements.

16. **CMOS (Complimentary Metal-oxide Semiconductor**) **Battery:** This battery is used to maintain the memory of the CMOS chip which contains things like the time, date, type of hardware and other settings specific to this computer.

EXERCISE

List out Hardware Components and various Ports of Personal Computer

LET US SUM UP

Most of the components in a PC are mounted on printed circuit board. This PCB is called as MOTHER BOARD. The motherboard is the largest PCB. The Processor, RAM chips & Expansion cards (Sound, NIC & Video etc,) are plugged into mother board.

The printed circuit boards eliminate the need for individual wires to connect components. It reduces the time and cost of building a PC.
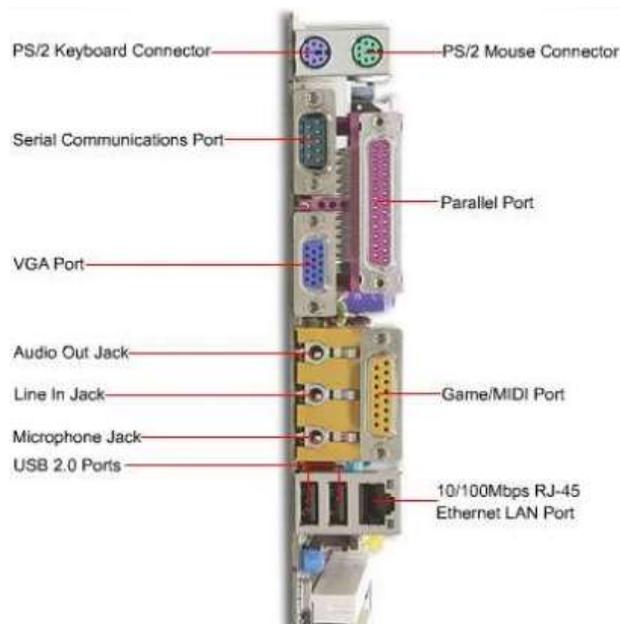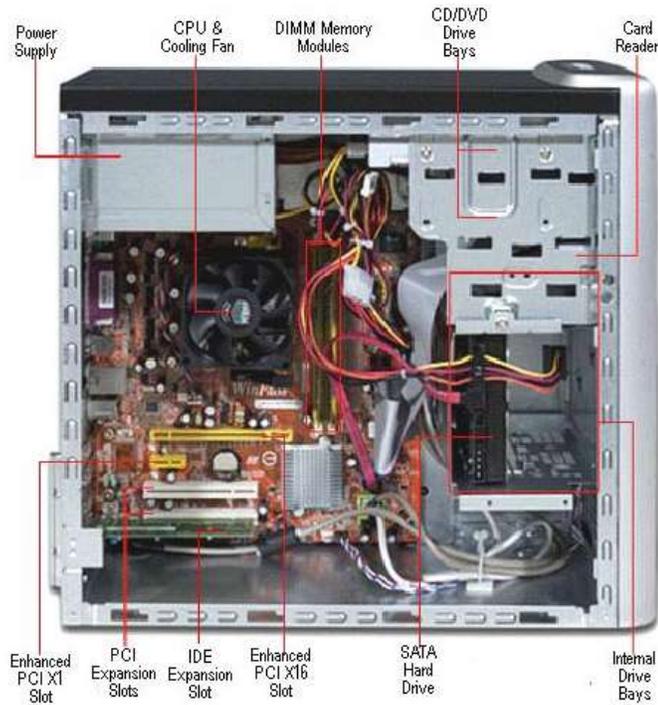
2. ACTIVITY NAME : INDENTIFYING PERSONAL COMPUTER POWER SUPPLY (SMPS) & OTHER INTERFACES (PORTS) OF PC

OBJECTIVE

On completion of this activity you will be able to recognize Personal computer power supply unit & its other ports and connectors

ACTIVITY

Study the physical appearance of power supply unit & other interfaces (ports)

<u>EXERCISE</u>

Draw the outline of mother board and draw the layout of various interfaces (ports) & power supply with input and output connectors. Also mark the colors of each wire.

LET US SUM UP

The power supply is located in the rear right quarter of the metallic enclosure. The power supply produces a series of dc outputs (+12v, +5v, -5v, -12v & ground etc.). The power connector for mother board may be two (2) connectors each having six (6) pins in the case of at type power supplies. The connector for mother board is 20 pin single connector in the case of ATX type power supply unit.

All the drives (HDD, FDD and CD ROM drive) are connected   through heavy duty four (4) wire connectors which are from SMPS.
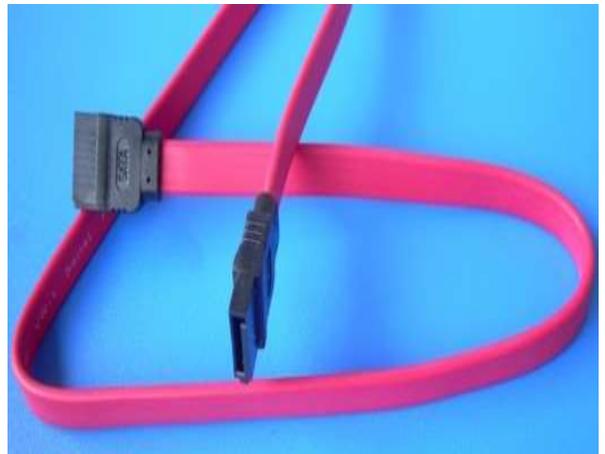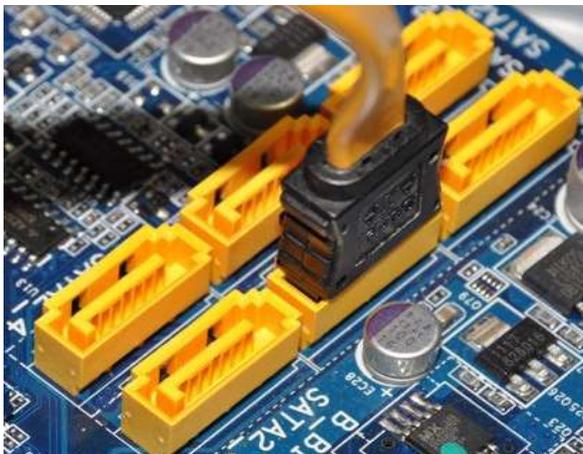
3. **ACTIVITY NAME: INDENTIFYING SATA PORTS & CABLES**

OBJECTIVE

On completion of this activity you will be able to Recognize Serial Advanced Technology Attachment (SATA) Ports & Cables.

ACTIVITY

Study the SATA ports on Mother Board.

EXERCISE

Draw the outlines of motherboard and the draw the SATA ports with its connectors.

LET US SUM UP

SATA Ports are built into Mother Board. All Mother Boards have SATA Ports where the Hard Disk, CD Drive & Power Supply these drives can be connected through SATA cables. Control Signals are sent to these devices via SATA cables from the ports

4. **ACTIVITY NAME: INDENTIFYING SERIAL & USB PORTS**

OBJECTIVE

On completion of this activity you will be able to Recognize

- Serial (Communications) Ports
- USB (Universal Serial Bus Ports)

ACTIVITY

Study the Serial & USB ports on Mother Board.

EXERCISE

Draw the outlines of motherboard and the draw the Serial & USB ports only. Also show how the ports are connected the PC Chassis (metallic body) to connect the modem, mouse, pen drive & Printer etc.

LET US SUM UP

The serial port is often referred to as an RS – 232 ports. RS-232 is the Electronics Industries Association's designation for a standard for how the various connectors in a serial port are to be used. Usually we find 9-pin and 25-pin connectors to connect modems and mouse to mother board. These ports are also called communication (COM –1, COM – 2) ports. Today we are extensively using USB ports for connecting key board, mouse, printer etc. These USB ports transfer the data at high rate.

5. ACTIVITY NAME: INDENTIFYING LAN CARD (Ethernet Card) & CONNECTORS

OBJECTIVE

On completion of this activity you will be able to Recognize

- LAN Card **(Ethernet Card)**
- LAN Connectors

ACTIVITY

Study the LAN card, LAN port & Connectors.

EXERCISE

Draw the outlines of motherboard and the draw the LAN (Ethernet) ports only. Also show how the ports are connected the PC Chassis (metallic body) to connect the Network etc.

LET US SUM UP

Alternatively referred to as an Ethernet port, network connection, and network port, the LAN port allows a computer to connect to a network using a wired connection. LAN port is connected to CAT cable using a RJ-45 connector. The two led lights will blink when the port is active.