

**Hardware Networking**

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**MODULE 1**

**Topic: The Visible Computer**

* **Assignment Level Basic**

1. **What is hardware?**

Hardware means the parts of a computer you can actually touch, like the keyboard, mouse, screen, and the inside parts like the processor and hard drive.

1. **What is the purpose of Hardware?**

The main goal of hardware is to make the computer work. It helps the computer to do tasks, save information, and let us input and see data.

* **Assignment Level Intermediate**

1. **List out two types of hardware.**

* **Input Devices:** Tools we use to put information into the computer, like a keyboard or mouse.
* **Output Devices:** Tools the computer uses to show us information, like a monitor or printer.

* **Assignment Level Advance**

1. **What is core hardware?**

* Core hardware is the most important parts inside a computer that make it run.
* This includes the brain (CPU), memory (RAM), the main board (motherboard), storage for files (like hard drives), the power source (PSU), and the part that shows pictures (GPU).

1. **Do a practical of identifying hardware**

* **Open System Information:** Use the search box to find and open "System Information."
* **Find the CPU:** Look under "System Summary" to see the type and speed of the processor.
* **Check RAM:** In the same place, find "Installed Physical Memory" to see how much memory you have.
* **Storage Devices:** Go to "Components" > "Storage" > "Drives" to see information about where files are kept.
* **Graphics Card (GPU):** Under "Components" > "Display," you can find out about your graphics card.
* **Other Parts:** Keep looking under "Components" to learn about more parts like the motherboard, internet parts, and sound devices.

**Topic: Category of components**

* **Assignment Level Basic**

1. **What are the category of components in hardware?**

* Input Devices: Tools you use to put data into the computer.
* Output Devices: Tools the computer uses to give data back to you.
* Storage Devices: Where your data is kept.
* Processing Devices: The parts that process data, like the CPU and GPU.
* Communication Devices: Used for sending and receiving data over networks.

1. **Why category is needed?**

* Helps in understanding what each part does.
* Makes it easier to fix or upgrade parts.
* Helps in teaching and learning about computers.

* **Assignment Level Intermediate**

1. **Do a practical to identify the components in which category they come.**

* Look at your computer or device.
* The keyboard and mouse are input devices because you use them to enter data.
* The monitor is an output device because it shows you data**.**
* The hard drive inside is a storage device because it keeps your files.
* The modem or wireless card is a communication device because it connects to the internet.

**Topic: Input Device**

* **Assignment Level Basic**

1. **What is input device?**

* Tools like a keyboard or mouse that let you send data to the computer.

1. **Why input device needed?**

* To enter information and commands into the computer.

* **Assignment Level Intermediate**

1. **List out the input device.**

* Keyboard, mouse, scanner, microphone, webcam.

1. **Do a practical to identify input device and describe how it works.**

* Use a keyboard: When you press a key, it sends a signal to the computer telling it what letter you pressed.
* The computer then shows the letter on the screen or uses it in a program.

**Topic: Output Device**

* **Assignment Level Basic**

1. **What are output device?**

* Tools that let the computer send data back to you, like a screen or printer**.**

1. **how does output device work?**

* Takes information from the computer and converts it into a form we can understand, like visuals on a monitor or printed pages from a printer.

* **Assignment Level Intermediate**

1. **List out the output device.**

* Monitor, printer, speakers, projector.

1. **Do a practical to identify the output device and describe its working process.**

* Use a monitor: The computer sends data to the monitor, which then shows the data as pictures or words that you can see.
* This lets you see what you're doing on the computer in real-time.

**Topic: Motherboard**

* **Assignment Level Basic**

1. **What is motherboard?**

* It's a big circuit board inside the computer that connects all parts like the CPU, memory, and storage.

1. **Why it is called motherboard?**

* Because it's like the "mother" of all computer components, holding and connecting them together.

* **Assignment Level Intermediate**

1. **What it is called if we remove all components from the motherboard?**

* It's still called a motherboard, but now it's just an empty board without attached components.

1. **Describe types of motherboard.**

* ATX (Advanced Technology eXtended): Common in desktops, offering lots of slots for components.
* Micro-ATX: Smaller than ATX, with fewer slots but still popular for smaller PCs.
* Mini-ITX: Very small, used for compact PCs, with minimal expansion slots.

* **Assignments level Advance:**

1. **Do a practical by identifying parts of motherboard.**

* Locate the CPU socket, RAM slots, power connector, SATA ports for storage, and PCIe slots for graphics cards or other cards.

1. **Do a practical by describing the data flow in motherboard**

* Data moves from the CPU to other parts like RAM and storage through circuits and buses on the motherboard.

1. **Do a practical by removing all removable parts from the motherboard.**

* Carefully take out the RAM, graphics card, any connected storage, and finally the CPU, leaving an empty motherboard.

**Topic: CPU**

* **Assignment Level Basic**

1. **What is CPU?**

* The part of the computer that does most of the calculating and processing.

1. **Write the full form of CPU.**

* Central Processing Unit.

* **Assignment Level Intermediate**

1. **What are the types of CPU?**

* Desktop CPUs, designed for personal computers.
* Server CPUs, made for handling many tasks on servers.
* Mobile CPUs, optimized for low power use in devices like phones and laptops.

1. **What do we need to keep the CPU Healthy?**

* Use good cooling, like fans or liquid cooling.
* Keep the computer clean from dust.
* Use thermal paste for better heat transfer.

* **Assignment Level Advance**

1. **Do a practical to remove processor and apply thermal paste in it and install it again.**

* Carefully take out the CPU, clean the old thermal paste, apply a new small dot of paste, and place the CPU back.

1. **Do a practical to Identify CPU and its Sockets.**

* Look at the CPU and motherboard manual to identify the socket type (like LGA1151 or AM4) and ensure they match**.**

**Topic: Monitor**

* **Assignment Level Basic**

1. **What is Monitor?**

* A screen that shows images and videos from the computer.

* **Assignment Level Intermediate**

1. **List out the types of monitor.**

* CRT (Cathode Ray Tube), older bulky monitors.
* LCD (Liquid Crystal Display), thin monitors using liquid crystals.
* LED (Light Emitting Diode), similar to LCD but uses LEDs for backlighting.

1. **Do a practical to identify monitor Technology.**

* Check the monitor specifications or manual to find out if it's CRT, LCD, or LED.

1. **What are the Technologies used in monitor.**

* CRT: Uses electron guns and phosphors to display images.
* LCD: Uses liquid crystals that get activated by electric current to display images.
* LED: Uses light-emitting diodes for backlighting in LCD screens.

* **Assignment Level Advance**

1. **Describe how does the crt monitor works.**

* Electron guns at the back shoot electrons to the front screen, which is coated with phosphorous.
* When electrons hit the phosphorous, it glows, creating images.
* Colors are made by combining red, green, and blue phosphors.

**Topic: system bus**

* **Assignment Level Basic**

1. **What is system bus**

* A system bus is a communication pathway for transferring data among components inside a computer, like between the CPU, memory, and peripherals**.**

* **Assignment Level Intermediate**

1. **List out the types of system bus.**

* Data Bus: Transfers actual data.
* Address Bus: Transfers information about where the data needs to go.
* Control Bus: Transfers control signals.

1. **Describe the working of system bus.**

* It connects the CPU to other components. The CPU sends data, address, and control signals through the bus to communicate with memory and input/output devices.

1. **Do a practical to identify the system bus.**

* Look at a motherboard diagram in its manual or online. The system bus isn't a single component but the pathways (traces) connecting the CPU, RAM, and other components.

**Topic: Chipset**

* **Assignment Level Basic**

1. **What is chipset?**

* The chipset is a group of microchips on the motherboard that manage data flow between the CPU, memory, and other peripherals.

* **Assignment Level Intermediate**

1. **What are the types of chipset?**

* Northbridge: Connects the CPU to high-speed devices like RAM and video cards.
* Southbridge: Manages lower-speed connections like USB, SATA, and PCI slots.

1. **Which chipset does have direct contact with the cpu.**

* The Northbridge, or in modern systems, this function might be integrated directly into the CPU itself.

1. **Do a practical to identify the chipset**

* Look at your motherboard. The chipset is usually located close to the CPU and is often covered by a heat sink.

* **Assignment Level Advance**

1. **Describe how the Northbridge chipset works**

* It connects the CPU with high-speed devices, like RAM and graphics cards, managing and facilitating communication between them.

**Topic:Memory**

* **Assignment Level Basic**

1. **What is memory?**

* Memory is a component that stores data temporarily or permanently for use by a computer's processor.

1. **What are the types of memory?**

* RAM (Random Access Memory): Temporary storage for data being actively used.
* ROM (Read-Only Memory): Permanent storage for essential data.

* **Assignment Level Intermediate**

1. **Describe memory in detail.**

* Memory in a computer is used to store data temporarily (RAM) for quick access by the CPU, improving speed and efficiency.

1. **What are memory types.**

* Volatile Memory (RAM): Loses its data when power is off.
* Non-Volatile Memory (ROM, SSD, HDD): Retains data without power.

* **Assignment Level Advance**

1. **Do a practical to identify memory types.**

* Open the computer case. RAM sticks are in the memory slots, while hard drives or SSDs represent non-volatile storage.

1. **Do a practical to install memories in system**

* Align the RAM stick with the slot ensuring the notch matches and press down firmly until the side clips click.

1. **Do a practical to identify main memory frequencies.**

* Use software like CPU-Z or check BIOS settings to see the operating frequency of your RAM.

**Topic: System Unit**

* **Assignment Level Basic**

1. **What is System Unit?**

* The system unit is the main part of a desktop computer that includes the chassis, motherboard, CPU, and other internal components.

* **Assignment Level Intermediate**

1. **How does system unit work?**

* The components inside the system unit work together to process data. The CPU processes the data, while the RAM stores temporary data, and other components like the hard drive store long-term data.

1. **What are the components and system unity?**

* Includes CPU, motherboard, RAM, storage devices (HDD, SSD), power supply, and expansion cards.
* **Assignment Level Advance**

1. **Do a practical to identify system unit.**

* The system unit is essentially the computer case and its contents, excluding external devices like monitors, keyboards, and mice.

1. **Do a practical to assemble and disassemble system unit.**

* Assemble: Start with the motherboard, install the CPU and RAM, add the power supply, connect storage devices, and finally add any expansion cards.
* Disassemble: Reverse the assembly process, carefully removing each component starting with expansion cards, storage devices, and finally the motherboard, CPU, and RAM.

**Topic: BIOS**

* **Assignment Level Basic** 
  1. **What is bios?**
     + - * BIOS is the program a computer's microprocessor uses to start the computer system after it is powered on.
* **Assignment Level Intermediate** 
  1. **What is the full form of bios**
* Basic Input/Output System.
  1. **Describe working process of BIOS.**
* Checks hardware with the POST (Power-On Self-Test), loads the bootloader, and starts the operating system.

* **Assignment Level Advance**

1. **Do a practical to reset bios when system is on.**

* Not recommended to reset BIOS while the system is on; it's safer to use the restart and enter BIOS setup method.

1. **Do a practical of Hard resetting the BIOS.**

* Power off the computer, remove the power cable, and reset the CMOS battery or jumper.

1. **Do a practical of identifying BIOS chip from the motherboard**

* Look on the motherboard for a labeled chip, often near the battery or PCI slots.

**Topic: CMOS**

* **Assignment Level Basic**

1. **What is CMOS?**

* CMOS is a technology used for making low-power semiconductor devices that store BIOS settings.

* **Assignment Level Intermediate**

1. **What is the full form of CMOS?**

* Complementary Metal-Oxide-Semiconductor.

1. **Describe the working process of CMOS.**

* Stores data for BIOS settings, such as system time and hardware configuration, powered by a battery when the computer is off.

* **Assignment Level Advance**

1. **Do a practical of identifying cmos.**

* Look for a round battery on the motherboard.

1. **Do a practical of installing cmos**

* Carefully place the CMOS battery in its holder on the motherboard.

1. **How do we know that cmos is not working.**

* The system forgets the time, date, and BIOS settings.

**Topic: Boot process**

* **Assignment Level Basic**

1. **What is Boot Process?**

* Sequence of events that starts a computer and loads the operating system.

* **Assignment Level Intermediate**

1. **What is the first process of boot?**

* BIOS initialization and self-test (POST).

1. **What is the final stage in the boot process?**

* Loading the operating system into RAM.

1. **Describe the boot process in Linux?**

* BIOS/UEFI starts, bootloader (GRUB) loads, then the Linux kernel is loaded, followed by system initialization and startup.

* **Assignment Level Advance**

1. **Describe about working with the grub bootloader.**

* Configuring GRUB settings for selecting which OS to start or kernel parameters.

1. **Describe working process of boot loader.**

* The bootloader identifies and loads the operating system kernel into memory

**Topic: SMPS**

* **Assignment Level Basic**

1. **What is SMPS?**

* Switched-Mode Power Supply converts electrical power efficiently.

1. **What is the process of SMPS?**

* Converts AC to low-voltage regulated DC power for the internal components.

* **Assignment Level Intermediate**

1. **DO a practical to install SMPS.**

* Secure SMPS in case, connect it to the motherboard, and other components.

1. **How many sata connectors are there in normal smps?**

* Typically, 2 to 6, depending on the model and make.
* **Assignment Level Advance**

1. **Do a practical to troubleshoot a smps without plugging it to the system.**

* Use a multimeter to check output voltages without connecting to the system.

1. **How many pins does atx power connector have?**

* 24 pins for modern motherboards.

**Topic: RAM**

* **Assignment Level Basic**

1. **What is RAM?**

* RAM is the computer's short-term memory, used for storing data temporarily while the computer is running.

1. **What is the full form of RAM?**

* Random Access Memory.

* **Assignment Level Intermediate**

1. **What are the types of ram?**

* DDR (DDR1, DDR2, DDR3, DDR4, DDR5) and SDRAM.

1. **Do a practical to identify RAM.**

* Look for long, thin sticks with multiple chips, usually near the CPU on the motherboard.

* **Assignment Level Advance**

1. **Do a Practical to identify ram and install it in a proper system.**

* Identify RAM type and slots on the motherboard. Align the notch on the RAM with the slot and press down firmly until the side clips lock.

**Topic: Device and cable**

* **Assignment Level Basic**

1. **What are the types of devices?**

* Input devices (keyboard, mouse)
* Output devices (monitor, printer)
* Storage devices (hard drive, SSD)

1. **What are the types of cable?**

* Power cables
* Data cables (HDMI, USB, Ethernet)

* **Assignment Level Intermediate**

1. **What cables are used to connect printer?**

* USB cable
* Ethernet cable (for network printers)
* Wireless (not a cable but a connection method)

1. **What was the first cable founded by Apple for data transfer?**

* Apple Desktop Bus (ADB) for peripherals (older technology)
* Lightning cable (more modern)

* **Assignment Level Advance**

1. **Do a practical to identify the sata cables.**

* Look for cables with L-shaped connectors used to connect hard drives, SSDs to the motherboard.

1. **Do a practical to identify and install the cables in the system.**

* Ensure the computer is powered off. Connect power cables to devices and data cables (SATA, USB, Ethernet) from devices to the motherboard or appropriate interfaces.

**Topic: Expansion card and slots**

* **Assignment Level Basic**

1. **Why expansion card needed?**

* To add new features or improve performance (e.g., graphics, sound).

1. **Why expansion slots needed?**

* To provide a place to install expansion cards.

* **Assignment Level Intermediate**

1. **What are the types of expansion card?**

* Graphics Card
* Sound Card
* Network Card

1. **What are the types of expansion cards?**

* PCI
* PCIe
* AGP (older systems)

* **Assignment Level Advance**

1. **Do a practical to identify the types of expansion slots**

* Examine the motherboard for slots. PCIe slots are common for graphics cards, while smaller PCI or PCIe slots may be used for other cards.

1. **Do a practical to install the Graphics card.**

* Insert the graphics card into a PCIe x16 slot and secure it to the case.

1. **Do a practical to install LAN card**

* Insert the LAN card into an appropriate PCI or PCIe slot and secure it.

**Topic: I/O Ports**

* **Assignment Level Intermediate**

1. **What is I/O ports?**

* Interfaces for connecting input and output devices to the computer.

1. **List out the I/O ports available**

* USB
* HDMI
* Ethernet
* VGA
* Audio jack

1. **Do a practical to identify the I/O ports.** 
   * + - * Look at the back and sometimes the front of a computer case to see and identify various ports for connecting devices.

**Topic: BIOS & CMOS**

* **Assignment Level Basic**

1. **What is BIOS?**

* Basic Input/Output System, firmware that initializes hardware during bootup.

1. **What is CMOS?**

* Complementary Metal-Oxide-Semiconductor, technology used for saving BIOS settings.

* **Assignment Level Intermediate**

1. **What is the role of BIOS in i/o?**

* Initializes and manages data flow between the operating system and attached devices.

1. **What is the role of i/o in CMOS?**

* Stores information about I/O settings.

* **Assignment Level Advance**

1. **Do a practical to reset BIOS**

* Access BIOS setup and select the option to reset to default settings.

1. **Do a practical to remove cmos.**

* Locate the CMOS battery on the motherboard, carefully remove it for a few minutes, then reinsert it to reset BIOS settings.

**Topic: Laptop & storage**

* **Assignment Level Basic**

1. **What is laptop?**

* A portable computer with all components integrated into a single unit.

1. **Why laptop is used widely now a days?**

* Portability, convenience, and increasingly powerful specs.

* **Assignment Level Intermediate**

1. **Describe the working process of laptop?**

* Similar to a desktop but optimized for low power use and compactness.

1. **What is storage?**

* Hardware used to save data.

1. **List out the types of storage.**

* HDD (Hard Disk Drive)
* SSD (Solid State Drive)
* External drives (USB flash drive)

* **Assignment Level Advance**

1. **Do a practical to identify types of storage.**

* Look at the physical shape (2.5" for SSDs and HDDs, smaller for USB drives) and interface (SATA for internal, USB for external).

1. **Do a practical to disassemble and assemble the storage.**

* For laptops, open the back panel to access and replace the storage device.

1. **Do a practical to install the storage devices.**

* Connect the storage device to the motherboard (for internal devices) or to an external port (for external devices).

**Topic: Printer**

* **Assignment Level Basic**

1. **What is printer?**

* A device that converts digital documents into physical copies (prints) on paper.

1. **Why is printer needed?**

* To create hard copies of documents, photos, or any digital content for records, sharing, or display.

* **Assignment Level Intermediate**

1. **Describe the working process of printer.**

* Receives digital data from a computer and uses inkjet or laser technology to transfer ink or toner onto paper.

1. **What are the types of printer.**

* Inkjet (sprays ink), Laser (uses toner and heat), Dot matrix (strikes ribbon with pins to print), and Thermal (heats special paper).

* **Assignment Level Advance**

1. **Do a practical to install the printer**

* Connect the printer to a computer via USB or network, install drivers, and configure settings through the operating system.

1. **Do a practical to Troubleshoot the improper printing.**

* Check ink/toner levels, ensure correct driver installation, clean print head (for inkjet), and check for paper jams or errors.

**Topic: Storage devices**

* **Assignment Level Basic**

1. **What is storage device?**

* Hardware used to save and retrieve digital data.

1. **Why we need storage device**

* To store data permanently or temporarily for retrieval, processing, and backup purposes.

* **Assignment Level Intermediate**

1. **List out the types of storage devices.**

* Hard Disk Drives (HDD), Solid State Drives (SSD), USB flash drives, Memory cards, Optical discs (CD, DVD, Blu-Ray)**.**

1. **Describe the working process of storage devices.**

* Data is written to the storage medium (magnetic, electronic, or optical) and can be retrieved or read when needed.
* **Assignment Level Advance**

1. **Do a practical to Remove storage devices and reinstall it and make a gpt disk.**

* Safely disconnect the storage device, physically remove it from the system, reinstall it, and format it as a GPT disk for modern partitioning support**.**

**Topic: ATA**

* **Assignment Level Intermediate**

1. **What is ATA?**

* Advanced Technology Attachment, an interface standard for connecting storage devices like hard drives and optical drives to a computer.

* **Assignment Level intermediate:** 
  1. **Describe working of ATA.**
* Uses a ribbon cable to connect storage devices to the motherboard's ATA connector, allowing data transfer between the device and the computer.

* **Assignment level Advanced:** 
  1. **Do a practical to identify and install ATA cables.**
* Locate the ATA interface on the motherboard and storage device, connect the ribbon cable ensuring correct orientation and secure connection.

**Topic: SATA**

* **Assignment Level Basic**

1. **What is SATA?**

* Serial Advanced Technology Attachment, a faster interface for connecting storage devices to a computer motherboard.

* **Assignment Level Advance**

1. **Describe the working of SATA.**

* Uses serial signaling technology to transfer data between the motherboard and storage devices, offering higher speeds compared to ATA.

1. **Do a practical to identify sata.**

* Look for thin, flat cables with L-shaped connectors.

1. **Do a practical to install SATA.**

* Connect the SATA cable from the storage device to the SATA port on the motherboard and connect the power cable.

1. **Where SATA does is used.**

* In modern internal hard drives, SSDs, and optical drives.

**Topic: SCSI**

* **Assignment Basic**

1. **What is SCSI?**

* Small Computer System Interface, a set of standards for connecting and transferring data between computers and peripheral devices.

1. **Why SCSI needed?**

* For high-speed data transfer and to connect multiple devices through a single interface, beneficial in servers and workstations.

* **Assignment level Intermediate:**

1. **What is the rpm of SCSI?**

* Depends on the specific SCSI hard drive, but can range from 7,200 to 15,000 RPM for high-performance models.

1. **Do a Practical to install scsi.**

* Connect the SCSI device to the SCSI controller card installed in the computer, and configure settings as required.

**Topic: Laptop**

* **Assignment Level Basic:** 
  1. **What is laptop?**
* A portable computer with an integrated screen, keyboard, and battery.
  1. **What are the types of laptop?**
* Notebook, Ultrabook, Convertible (2-in-1), Gaming laptop.
  1. **Diffrent names of laptop.**
* Notebook, Ultrabook, Netbook (older, smaller laptops), Convertible.

* **Assignment level Intermediate:** 
  1. **What are the parts of laptop?**
* Screen, Keyboard, Touchpad, Battery, Motherboard, CPU, RAM, Storage (HDD/SSD), Ports.
  1. **Do a practical of identifying parts of the laptop.**
* Locate and name the external and accessible internal components of a laptop.

* **Assignment level Advance.** 
  1. **Do a practical to disassemble the laptop.**
* Carefully remove screws, open the case, and identify internal components while following safety procedures.
  1. **Do a practical to change the RAM in the laptop.**
* Locate the RAM slots, remove existing RAM (if necessary), and install new RAM modules ensuring proper alignment and secure fit.

**TOPIC: PRINTER**

* **ASSIGNMENT LEVEL BASIC:** 
  1. **WHAT IS PRINTER?**
* A printer is a device that accepts text and graphic output from a computer and transfers the information to paper, usually to standard size sheets of paper.
  1. **IS IT AN INPUT DEVICE OR OUTPUT DEVICE?**
* It is an output device because it outputs information from the computer onto paper.

* **Assignment level intermediate:** 
  1. **Describe the types of printer.**
* Inkjet Printer: Sprays ink directly onto paper to print text and images.
* Laser Printer: Uses a laser beam to produce an image on a drum, which is then rolled in toner and transferred to paper.
* Dot Matrix Printer: Creates characters and illustrations by striking pins against an ink ribbon to print on paper.
* Thermal Printer: Uses heat to transfer an impression onto paper, commonly used in calculators and fax machines.
  1. **Describe inkjet printer.**
     + - * Works by propelling droplets of ink onto paper.
         * Suitable for color printing and can produce high-quality photos and documents.
         * Generally quieter and less expensive than laser printers.
* **Assignment level Advanced:** 
  1. **Do a practical of network installation of the printer.**
* Connect the printer to a network via Ethernet or Wi-Fi.
* Install printer drivers on each computer that will use the printer.
* Set up the printer on the network through the printer’s software or using the IP address.
  1. **do a practical to troubleshoot the printer of no cartridge error**
* Ensure the ink or toner cartridges are properly installed.
* Check for any protective tape or clips on the new cartridge and remove them.
* Clean the cartridge contacts and the printer contacts with a soft, lint-free cloth.
* Reset the printer by turning it off, waiting a few seconds, and turning it back on.
* If the error persists, try using a different cartridge to determine if the issue is with the cartridge or the printer.