

Module -1 : Understanding of Hardware and Its Components.

Section 1: Multiple Choice.

Q - 1 : Which of the following is NOT a component of the CPU?

1. ALU
2. **RAM**
3. CU
4. 1 and 3 both.

A - 1 : 2. RAM

Q - 2 : What is the function of RAM in a computer?

A - 2 : RAM (Random Access Memory) is used to **temporarily store data and instructions** that the computer is currently using.

- **Functions of RAM:**

- Stores programs and data that are in use.
- Allows **fast access** for the CPU.
- Helps in **smooth multitasking**
- Data in RAM is **volatile** (it is lost when the computer is turned off)

Q - 3 : Which of the following is a primary storage device?

1. HDD
2. SSD
3. SD card
4. 1 and 2 both..

A - 3 : **None of the given options.** because all the given options are **secondary storage devices**, not primary storage.

Q - 4 : What is the purpose of a GPU?

A - 4 : GPUs (Graphics Processing Units) are specialized processors originally for rendering images, but now power diverse applications like :

- Gaming & Graphics,

- Artificial Intelligence (AI) & Machine Learning (ML),
- Video & Content Creation,
- High-Performance Computing (HPC),
- Data Analytics,
- Cryptocurrency,
- Virtual & Augmented Reality (VR/AR).

Section 2: True or False :

Q - 5 : The motherboard is the main circuit board of a computer where other components are attached.

A - 5 : TRUE

Q - 6 : A UPS (Uninterruptible Power Supply) is a hardware device that provides emergency power to a load when the input power source fails.

A - 6 : TRUE

Q - 7 : An expansion card is a circuit board that enhances the functionality of a component.

A - 7 : TRUE

Section 3: Short Answer.

Q - 8 : Explain the difference between HDD and SSD.

A - 8 :

Feature	HDD (Hard Disk Drive)	SSD (Solid State Drive)
Storage type	Uses spinning magnetic disks	Uses flash memory (no moving parts)
Speed	Slower read/write speed	Much faster read/write speed
Durability	Less durable (mechanical parts)	More durable and shock-resistant
Noise	Makes noise while operating	Completely silent

Power consumption	Consumes more power	Consumes less power
Cost	Cheaper per GB	More expensive per GB
Boot time	Slower system startup	Faster system startup

Q - 9 : Describe the function of BIOS in a computer system.

A - 9 : The BIOS is a firmware stored on the motherboard that performs the following functions:

- **Starts the computer:** It runs when the computer is powered on.
- **POST (Power-On Self-Test):** Checks and tests hardware components like RAM, keyboard, and storage to ensure they are working properly.
- **Loads the operating system:** It locates and loads the operating system into memory.
- **Provides basic hardware control:** Allows the operating system to communicate with hardware components such as the keyboard, mouse, and display.
- **System configuration:** Stores and manages system settings like date, time, and boot sequence.

Q - 10 : List and briefly explain three input devices commonly used with computers.

A - 10 : Three common input devices:

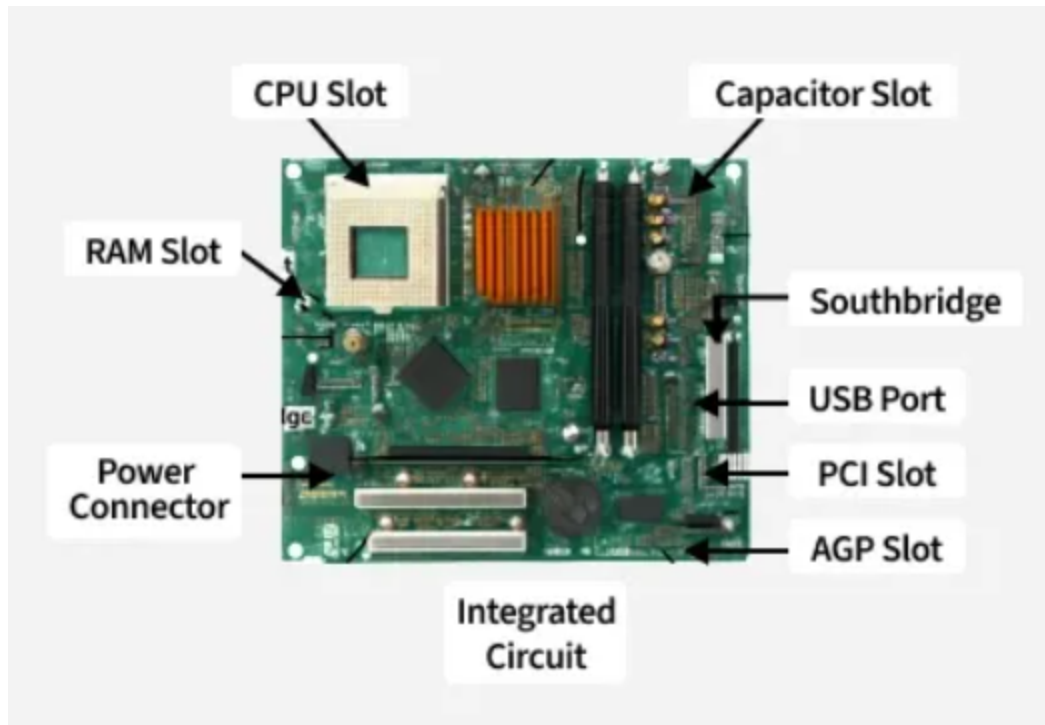
- **Keyboard** – Used to enter text, numbers, and commands into the computer.
- **Mouse** – Used to point, click, drag, and select items on the screen.
- **Scanner** – Used to convert physical documents or images into digital form.

Section 4: Practical Application.

Q - 11 : Identify and label the following components on a diagram of a motherboard: CPU , RAM slots , SATA connectors ,PCI-E slot.

A - 11 :





Q - 12 : Demonstrate how to install a RAM module into a computer.

A - 12 : Steps to Install a RAM Module in a Computer.

1. Turn off the computer and unplug it

- Shut down the system completely and disconnect the power cable to avoid electric shock.

2. Open the computer case

- Remove the side panel of the CPU cabinet using a screwdriver or thumb screws.

3. Locate the RAM slots

- Find the long slots on the motherboard, usually near the CPU. The slots have clips on both ends.

4. Open the RAM slot clips

- Gently push the clips outward to open the slot.

5. Align the RAM module correctly

- Check the notch on the RAM module and align it with the notch in the RAM slot. It fits only one way.

6. Insert the RAM module

- Place the RAM into the slot and press down firmly and evenly until the clips automatically snap back into place.

7. Close the computer case

- Reattach the side panel and tighten the screws.

8. Power on the computer

- Turn on the system and check if the RAM is detected properly in BIOS or the operating system.
- RAM installation is complete when the module is firmly seated and the clips are locked.

Q - 13 : Discuss the importance of proper cooling mechanisms in a computer system. Include examples of cooling methods and their effectiveness.

A - 13 : Proper cooling is essential to maintain the performance, stability, and lifespan of a computer system.

Why Cooling Is Important:

- **Prevents overheating:** Excess heat can damage internal components.
- **Maintains performance:** Overheating causes thermal throttling, which slows down the CPU and GPU.
- **Increases lifespan:** Cooler components last longer and work more reliably.
- **Ensures system stability:** Reduces crashes, shutdowns, and hardware failure.

- **Protects data:** Prevents sudden shutdowns that may lead to data loss.

Common Cooling Methods and Their Effectiveness :

1. Air Cooling (Fans & Heat Sinks:

- **Effective for normal and moderate use** such as office work and basic gaming.
- Uses fans and metal heat sinks to dissipate heat.
- Affordable and easy to maintain.

2. Liquid Cooling (Water Cooling)

- Uses liquid to transfer heat away from components.
- **Highly effective** for high-performance systems and gaming PCs.
- Quieter and better at handling heavy workloads, but more expensive.

3. Thermal Paste

- Applied between the CPU and heat sink to improve heat transfer.
- **Very effective** in enhancing cooling efficiency.

4. Proper Ventilation (Case Airflow)

- Uses intake and exhaust fans to maintain airflow inside the case.
- **Essential** for overall system cooling and works with other methods.

5. Passive Cooling

- Relies on heat sinks without fans.
- **Less effective**, suitable only for low-power devices.

Q - 14 : Explain the concept of bus width and its significance in computer architecture.

A - 14 : **Bus Width in Computer Architecture**

Bus width refers to the number of bits that a computer's data bus can transfer at one time between components such as the CPU, memory, and other devices. It is usually measured in **bits** (for example, 8-bit, 16-bit, 32-bit, or 64-bit).

Concept of Bus Width

- The bus acts like a data highway inside the computer.
- Bus width determines how much data can travel simultaneously.
- A wider bus can carry more data in a single cycle.

Significance of Bus Width

1. Performance:

- A larger bus width allows more data to be transferred at once, increasing system speed.

2. Data Handling Capacity:

- Wider buses enable the CPU to process larger chunks of data efficiently.

3. Memory Access:

- A wider memory bus improves data transfer rates between the CPU and RAM.

4. System Capability:

- Modern systems (e.g., 64-bit) can handle more memory and perform complex tasks more efficiently.

Example

- An **8-bit bus** transfers 1 byte at a time.
- A **64-bit bus** transfers 8 bytes at a time, making it much faster.

Conclusion : Bus width is a crucial factor in computer architecture because it directly affects data transfer speed, processing power, and overall system performance.

Module 2 : Installation and Maintenance of Hardware and Its components :

Section 1: Multiple Choice:

Q - 1 : Which of the following precautions should be taken before working on computer hardware?

- a) Ensure the computer is plugged in to prevent electrostatic discharge.
- b) Wear an anti-static wrist strap to prevent damage from electrostatic discharge.**
- c) Work on carpeted surfaces to prevent slipping.
- d) Use magnetic tools to handle components more easily.

A - 1 : b) Wear an anti-static wrist strap to prevent damage from electrostatic discharge.

Q - 2 : What is the purpose of thermal paste during CPU installation?

- a) To insulate the CPU from heat.
- b) To provide mechanical support for the CPU.
- c) To improve thermal conductivity between the CPU and the heat sink.**
- d) To prevent the CPU from overheating.

A - 2 : c) To improve thermal conductivity between the CPU and the heat sink.

Q - 3 : Which tool is used to measure the output voltage of a power supply unit (PSU)?

- a) Multimeter**
- b) Screwdriver

- c) Pliers
- d) Hex key

A - 3 : a) Multimeter

Q - 4 : Which component is responsible for storing BIOS settings, such as date and time, even when the computer is powered off?

a) CMOS battery

- b) CPU
- c) RAM
- d) Hard drive

A - 4 : a) CMOS battery

Section 2: True or false :

Q - 5 : When installing a new hard drive, it is essential to format it before use.

A - 5 : TRUE

Q - 6 : A POST (Power-On Self-Test) error indicates a problem with the CPU.

A - 6 : FALSE

Q - 7 : It is safe to remove a USB flash drive from a computer without ejecting it first.

A - 7 : FALSE

Section 3: Short Answer :

Q - 8 : Describe the steps involved in installing a new graphics card in a desktop computer.

A - 8 :

Step : 1	- Power off the computer.
	Shut down the system completely and unplug the power cable.

Step : 2	- Open the computer case
	Remove the side panel using a screwdriver if required.
Step : 3	- Ground yourself
	Wear an anti-static wrist strap or touch a metal part of the case to avoid electrostatic discharge.
Step : 4	- Locate the PCI-Express (PCIe) slot
	Find the long PCIe x16 slot on the motherboard.
Step : 5	- Remove the expansion slot cover
	Unscrew and remove the metal bracket aligned with the PCIe slot.
Step : 6	- Insert the graphics card
	Carefully align the card with the PCIe slot and press it firmly until it clicks into place.
Step : 7	- Secure the graphics card
	Use screws to fasten the card to the case.
Step : 8	- Connect power cables (if required)
	Attach the necessary PCIe power connectors from the PSU to the graphics card.
Step : 9	- Close the computer case
	Reattach the side panel and tighten screws.
Step : 10	- Power on and install drivers
	Plug in the power cable, start the computer, and install/update graphics drivers from the manufacturer's website.

Q - 9 : What is RAID, and what are some common RAID configurations?

A - 9 : RAID (Redundant Array of Independent Disks) is a technology that combines multiple hard drives into a single logical unit to improve performance, data redundancy (backup protection), or both.

Common RAID Configurations :

		Advantage :	Disadvantage :
RAID 0 (Striping)	Data is split across multiple drives.	Very high performance.	No data protection (if one drive fails, all data is lost).
RAID 1 (Mirroring)	Data is duplicated on two drives.	High data protection.	Storage capacity is reduced by half.
RAID 5 (Striping with Parity)	Data and parity information are spread across three or more drives.	Good balance of performance and fault tolerance.	Slower write performance compared to RAID 0.
RAID 10 (RAID 1 + RAID 0)	Combines mirroring and striping.	High performance and strong fault tolerance.	Requires at least four drives and more cost.

Section 4: Practical Application :

Q - 10 : Demonstrate how to replace a CPU fan in a desktop computer.

A - 10 :

Step : 1 : Shut down and unplug the computer

- Turn off the system completely and remove the power cable.

Step : 2 : Open the computer case

- Remove the side panel using a screwdriver if needed.

Step : 3 : Ground yourself

- Use an anti-static wrist strap or touch a metal part of the case to prevent static damage.

Step : 4 : Locate the CPU fan

- Find the fan mounted on top of the CPU heat sink on the motherboard.

Step : 5 : Disconnect the fan cable

- Unplug the fan's power connector from the CPU_FAN header on the motherboard.

Step : 6 : Remove the old CPU fan

- Unscrew or unclip the fan/heat sink assembly, depending on the model, and carefully lift it off.

Step : 7 : Clean old thermal paste

- Use isopropyl alcohol and a lint-free cloth to clean old thermal paste from the CPU and heat sink.

Step : 8 : Apply new thermal paste

- Apply a small, pea-sized amount of thermal paste to the center of the CPU.

Step : 9 : Install the new CPU fan

- Place the fan/heat sink on the CPU, align it properly, and secure it with screws or clips.

Step : 10 : Reconnect the fan cable

- Plug the fan connector back into the CPU_FAN header.

Step : 11 : Close the case and power on

- Reattach the side panel, plug in the power cable, and start the computer.

Step : 12 : Check fan operation

- Ensure the fan is spinning properly and monitor CPU temperature.

Section 5: Essay :

Q - 11 : Discuss the importance of regular maintenance for computer hardware and provide examples of maintenance tasks.

A - 11 : Regular maintenance of computer hardware is essential to ensure optimal performance, longer lifespan, and reliable operation of a computer system. It helps prevent unexpected failures and costly repairs.

Importance:

1. **Improves Performance**
 - Removing dust and updating components helps the system run faster and more efficiently.
2. **Prevents Overheating**
 - Cleaning fans and vents ensures proper airflow, reducing the risk of CPU and GPU overheating.
3. **Extends Hardware Life**
 - Well-maintained components experience less wear and tear and last longer.
4. **Reduces System Failures**
 - Early detection of issues (like loose cables or failing drives) prevents major breakdowns.
5. **Ensures Data Safety**
 - Regular checks reduce the risk of hardware-related data loss.

Examples of Hardware Maintenance Tasks:

- **Cleaning dust** from fans, heat sinks, and vents.
- **Checking and tightening cables** and connections.
- **Replacing thermal paste** on CPU when required.
- **Monitoring temperatures** and fan performance.
- **Testing hard drives** for errors and failures.
- **Updating BIOS and firmware** when necessary.