**Assignment**

**1] Which of the following is not a component of the CPU?**

A) ALU  
B) RAM  
C) CU  
D) 1 and 3 both

**Answer**:  
The correct answer is **RAM**.

**Explanation**:  
The ALU (Arithmetic Logic Unit) and CU (Control Unit) are components of the CPU. RAM (Random Access Memory) is not part of the CPU; it is system memory used for temporary data storage.

2] **What is the function of RAM in a computer?**

**Answer:**  
**RAM (Random Access Memory)** is a type of volatile memory that temporarily stores data and instructions for quick access by the CPU. It plays a crucial role in system performance.

**Main Functions of RAM:**

1. **Fast Data Access** – Stores frequently used data for quick retrieval.
2. **Multitasking** – Enables running multiple applications smoothly.
3. **Temporary Storage** – Holds active programs but loses data when powered off.
4. **Enhances System Performance** – More RAM reduces lag and speeds up operations.
5. **Supports Virtual Memory** – Works with storage to prevent system crashes when RAM is full.

*Note: Increasing RAM can improve overall system speed and efficiency, making it essential for gaming, video editing, and multitasking.*

*3]* ***Which of the following is the primary storage device?***

A) HDD  
B) SSD  
C) SD CARD  
D) 1 and 2 both

**Answer**:  
The correct answer is **HDD.**

### 4] What is the purpose of a GPU?

A **GPU (Graphics Processing Unit)** is designed for **graphics rendering and parallel processing**. It accelerates tasks like **3D rendering, shading, and texture mapping**, making it essential for **gaming, video editing, and animation**. Additionally, GPUs handle **AI, machine learning, scientific computing, cryptocurrency mining, and video streaming** due to their ability to process multiple tasks simultaneously.

For example, an **NVIDIA RTX 4090** is ideal for gaming, while an **NVIDIA A100** is preferred for AI and deep learning applications.

**Section 2 {True or False}**

1] **The motherboard is the main circuit board of a computer where other components are attached**

1] True

2] False

## Answer:

True. The motherboard is the main circuit board of a computer where essential components like the CPU, RAM, GPU, and storage devices are attached. It also provides connections for peripherals and enables communication between all hardware components.

## 2] A UPS is a hardware device that provides emergency power to a load when the input power fails.

1] True

2] False

## Answer:

True. A UPS (Uninterruptible Power Supply) is a hardware device that provides emergency power to a system when the main power source fails. It helps prevent data loss, hardware damage, and unexpected shutdowns by supplying temporary power using a built-in battery.

3] **An expansion card is a circuit board that enhances the functionality of a component.**

1] True

2] False

## Answer:

TrueAn expansion card is a circuit board that enhances the functionality of a computer by adding new capabilities, such as improved graphics, sound, network connectivity, oradditional storage. Common examples include graphics cards (GPU), sound cards, networkinterface cards (NIC), and storage controller cards.

***Section:3 Short Answer***

## 1] Question: Explain the difference between HDD and SSD.

Answer: A Hard Disk Drive (HDD) and a Solid State Drive (SSD) are both storage devices, but they differ in speed, durability, and technology.

|  |  |  |
| --- | --- | --- |
| Feature | HDD (Hard Disk Drive) | SSD (Solid State Drive) |
| Technology | Uses spinning magnetic disks and a mechanical read/write arm. | Uses flash memory with no moving parts. |
| Speed | Slower, with read/write speeds around 100-200 MB/s. | Much faster, with speeds up to 3,500 MB/s (NVMe SSDs). |
| Durability | More prone to damage due to moving parts. | More durable since it has no moving parts. |
| Lifespan | Can wear out over time due to mechanical wear. | Lasts longer, but has a limited number of write cycles. |
| Noise & Heat | Produces noise and more heat due to spinning disks. | Silent and generates less heat. |
| Cost | Cheaper, but slower. | More expensive, but faster and more efficient. |
| Best For | Large storage at a lower cost (e.g., backups, general storage). | Faster performance (e.g., gaming, operating system, professional work). |

Example:  
- A HDD is ideal for storing large files like movies and backups.  
- An SSD is best for fast performance, such as booting an OS or running software quickly.

## 2] Question: Describe the function of BIOS in a computer system.

## Answer: BIOS (Basic Input/Output System) is a firmware embedded in a computer’s motherboard that initializes hardware and manages data flow between the operating system and attached devices.

### Main Functions of BIOS:

• Power-On Self-Test (POST): Checks hardware components like RAM, CPU, and storage for errors before booting.

• Boot Process: Locates and loads the operating system from the storage device.

• Hardware Initialization: Configures hardware components (keyboard, display, storage, etc.) before the OS starts.

• BIOS Setup Utility: Allows users to configure system settings like boot order, clock speed, and security options.

• BIOS Firmware Updates: Provides updates to improve compatibility, security, and performance.

• Manages System Communication: Ensures proper interaction between hardware and software components.

### Example:

When a computer is powered on, BIOS performs POST, detects available storage devices, and then loads the operating system from the boot drive.

## 3] Question: List and briefly explain three input devices commonly used with computers.

## Answer: Input devices allow users to provide data and commands to a computer. Below are three commonly used input devices:

### Keyboard

A keyboard is a primary input device used to enter text, numbers, and commands into a computer. It consists of keys for letters, numbers, functions, and shortcuts.

### Mouse

A mouse is a pointing device that allows users to navigate and interact with on-screen elements. It typically has buttons for clicking, a scroll wheel, and sometimes additional programmable buttons.

### Scanner

A scanner is used to convert physical documents or images into a digital format. It captures printed text, photos, or barcodes and transfers them to the computer for processing or storage.

**4: Practical Application.**

## 1] Question: Identify and label the following components on a diagram of a motherboard:

### Components to Label:

• CPU Socket – Slot where the processor (CPU) is installed.

• RAM Slots (DIMM Slots) – Slots where memory (RAM) modules are inserted.

• Power Connector – Connects the motherboard to the power supply.

• PCIe Slots – Expansion slots for graphics cards, sound cards, and other peripherals.

• SATA Ports – Connects storage devices like SSDs and HDDs.

• Chipset – Manages communication between CPU, RAM, and storage.

• I/O Ports – USB, HDMI, Ethernet, and other external connection ports.

• CMOS Battery – Maintains system time and BIOS settings when powered off.

Motherboard Diagram:

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## 2] Question: Demonstrate how to install a RAM module into a computer.

## Answer: Installing a RAM module is a simple process, but it must be done carefully to avoid damaging the components. Follow these steps to install RAM properly:

### Step 1: Power Off and Unplug the Computer

Shut down the computer completely and unplug it from the power source to prevent electrical damage.

### Step 2: Open the Computer Case

Remove the screws or clips securing the side panel of the case and locate the RAM slots on the motherboard.

### Step 3: Prepare the RAM Module

Hold the RAM module by the edges (avoid touching the gold contacts) and align the notch correctly with the slot.

### Step 4: Insert the RAM Module

Push down the locking clips on both sides of the RAM slot, align the RAM module, and press it in firmly until the clips snap back into place.

### Step 5: Secure and Close the Case

Ensure the RAM is fully inserted and locked, then close the computer case and secure it with screws.

### Step 6: Power On and Verify Installation

Plug the computer back in, turn it on, and check if the RAM is recognized using Task Manager (Windows) or About This Mac (MacOS).

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**5: Essay**

1: **Discuss the importance of proper cooling mechanisms in a computer system. Include examples of cooling methods and their effectiveness.**

Answer: Cooling is essential in a computer system to prevent overheating, ensure optimal performance, and extend the lifespan of components. Excessive heat can cause system instability, hardware damage, and reduced efficiency.

#### ****Why Proper Cooling is Important:****

1. **Prevents Overheating:** High temperatures can damage the CPU, GPU, and motherboard.
2. **Maintains Performance:** Overheating can lead to **thermal throttling**, slowing down processing speeds.
3. **Increases Hardware Longevity:** Proper cooling reduces wear and tear on electronic components.
4. **Enhances System Stability:** Prevents unexpected crashes, shutdowns, and malfunctions.

#### ****Common Cooling Methods and Their Effectiveness:****

1. **Air Cooling (Fans & Heatsinks)**
   * Uses fans and metal heatsinks to dissipate heat from components like the CPU and GPU.
   * **Effectiveness:** Cost-effective and sufficient for most standard users but may struggle under extreme workloads.
2. **Liquid Cooling (Water Cooling Systems)**
   * Circulates coolant through pipes and a radiator to absorb heat more efficiently than air cooling.
   * **Effectiveness:** Highly efficient, especially for gaming PCs and workstations, but more expensive and requires maintenance.
3. **Thermal Paste Application**
   * A special compound applied between the CPU and heatsink to improve heat transfer.
   * **Effectiveness:** Essential for all cooling solutions to maximize efficiency.
4. **Phase-Change Cooling**
   * Uses refrigeration techniques to cool components to sub-zero temperatures.
   * **Effectiveness:** Extremely powerful but expensive and mainly used for extreme overclocking.
5. **Passive Cooling (Heat Sinks without Fans)**
   * Relies on large metal heatsinks to dissipate heat naturally.
   * **Effectiveness:** Silent and durable but not ideal for high-performance computing.

#### ****Conclusion:****

Choosing the right cooling method depends on the system's workload and budget. Proper cooling enhances system efficiency, prevents overheating, and ensures long-term reliability.

**2] Explain the concept of bus width and its significance in computer architecture.**

#### Answer: ****What is Bus Width?****

Bus width refers to the number of bits that can be transmitted simultaneously across a computer’s internal data pathways, known as buses. It is measured in bits (e.g., 32-bit, 64-bit) and directly impacts the system’s ability to transfer data efficiently.

#### ****Types of Buses in a Computer:****

1. **Data Bus** – Transfers actual data between components.
2. **Address Bus** – Determines the memory locations where data is stored or retrieved.
3. **Control Bus** – Sends control signals to coordinate data transfers.

#### ****Significance of Bus Width in Computer Architecture:****

* **Increases Data Transfer Speed** – A wider bus allows more data to be transferred per cycle, improving system performance.
* **Enhances Memory Access** – A larger address bus enables access to more memory, crucial for modern computing.
* **Supports High-Performance Applications** – Systems with wider buses (e.g., 64-bit processors) handle complex tasks and large datasets efficiently.

#### ****Example of Bus Width in Action:****

* A **32-bit bus** can transfer 4 bytes per cycle, while a **64-bit bus** can transfer 8 bytes per cycle, doubling data throughput.
* Modern computers use **64-bit architectures**, allowing them to address large memory capacities and perform faster computations