

Module 1

Section 1: Multiple Choice

1. Which of the following is NOT a component of the CPU?
 - RAM

2. What is the function of RAM in a computer?
 - RAM is used as temporary storage for data and instructions that the CPU needs to access quickly while running programs. It allows for fast read and write operations, helping improve the overall performance of the system.

3. Which of the following is a primary storage device?
 - HDD & SSD

4. What is the purpose of a GPU?
 - The purpose of a GPU (Graphics Processing Unit) is to handle the rendering of images, video, and animations. It is specialized for parallel processing and is essential for tasks like gaming, video editing, and running simulations that require high-performance graphics.

Section 2: True or False

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

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

– TRUE

7. True or False: An expansion card is a circuit board that enhances the functionality of a component.

– TRUE

Section 3: Short Answer

8. Explain the difference between HDD and SSD.

– HDD:-

- Random access time 5-10 ms
- Read latency time high.
- Low reliability
- Relatively large and heavy

– SSD:-

- Random access time 0.1 ms
- Read latency time very low
- High reliability
- Small and lightweight

9. Describe the function of BIOS in a computer system.

– Power-On Self-Test (POST):

- When the computer is turned on, BIOS performs POST to check if essential hardware (RAM, CPU, storage, keyboard, etc.) is functioning properly.
- If a problem is detected, BIOS may display an error message or beep codes.

Boot Process Management:

- BIOS locates the boot loader in storage devices (HDD, SSD, USB) and hands over control to the operating system.

- It follows a boot order (e.g., first USB, then SSD) which can be configured in BIOS settings.

Hardware Initialization & Configuration:

- BIOS initializes and configures hardware components like CPU, RAM, and disk drives before the OS loads.
- It allows users to modify settings such as clock speeds, fan control, and power management.

Provides an Interface for System Settings:

- Users can access the BIOS setup utility (by pressing F2, F10, Del, or Esc at startup) to change system settings.
- Common settings include boot priority, enabling/disabling hardware, and security options like passwords.

Manages Data Flow Between OS and Hardware:

- BIOS acts as a bridge between the operating system and low-level hardware, ensuring smooth communication.

BIOS Firmware Updates:

- Manufacturers release BIOS updates to improve compatibility, fix bugs, or enhance performance.
- Updating BIOS can fix hardware issues but must be done carefully to avoid system failures

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

– Keyboard

- A keyboard is the primary input device used to enter text, numbers, and commands into a computer.

- It consists of keys for letters, numbers, function keys (F1-F12), and special keys like Ctrl, Alt, and Shift.
- Common types include mechanical, membrane, and virtual keyboards.

Mouse

- A mouse is a pointing device used to move the cursor and interact with graphical elements on the screen.
- It typically has left and right buttons and a scroll wheel for navigation.
- Types include wired, wireless, optical, and trackball mice.

Scanner

- A scanner is used to convert physical documents and images into digital format.
- It works by scanning a document and saving it as an image or PDF file.
- Common types include flatbed, handheld, and barcode scanners.

Section 4: Practical Application

11. Identify and label the following components on a diagram of a motherboard.

– CPU (Central Processing Unit) Socket

- Found near the center or top-middle of the motherboard.
- A large square socket with a lever for securing the processor.

RAM Slots (Memory Slots)

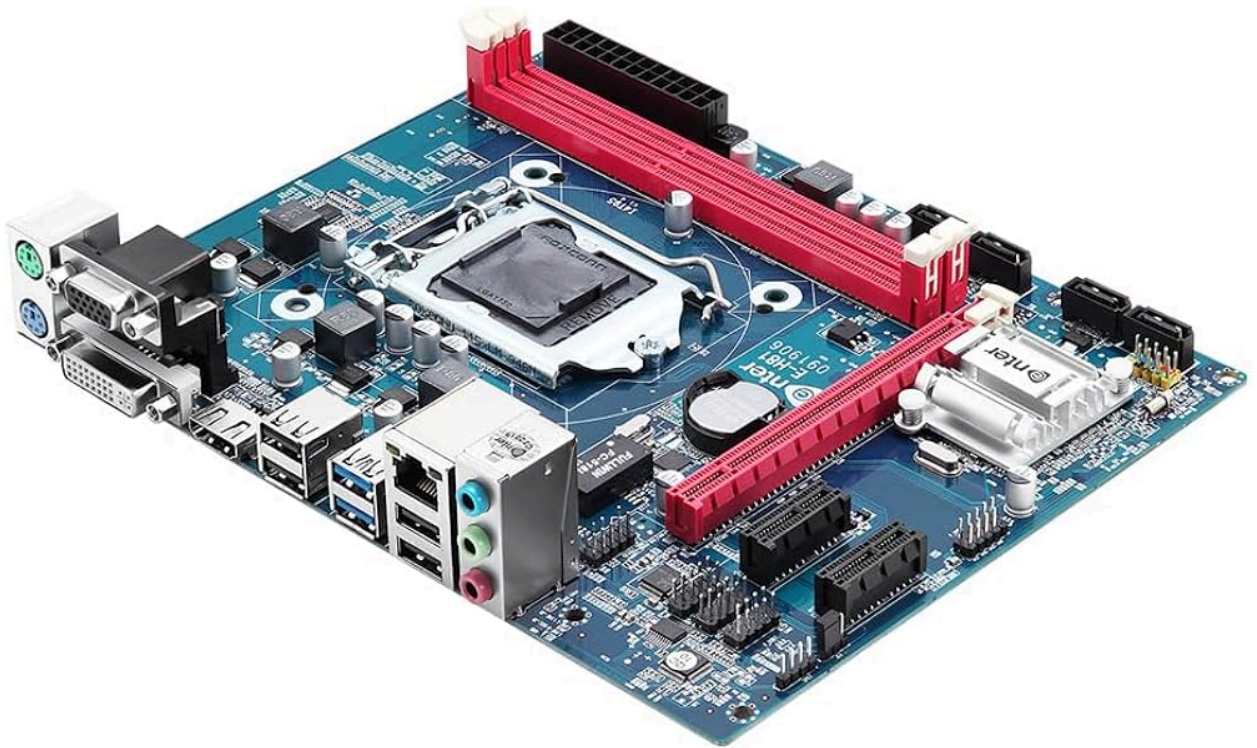
- Long, thin slots usually placed next to the CPU socket.
- Commonly two or four slots for inserting RAM sticks.

SATA Connectors

- Small L-shaped ports located near the edge of the motherboard.
- Used to connect storage devices like HDDs and SSDs via SATA cables.

PCI-E (Peripheral Component Interconnect Express) Slot

- Long slot(s) located in the lower half of the motherboard.
- Used to install graphics cards, sound cards, or expansion cards.



12. Demonstrate how to install a RAM module into a computer.

- 1.) Power Off and Unplug the Computer

- Shut down your PC completely.
- Disconnect it from the power source.
- Press the power button for a few seconds to discharge any remaining power.

2.) Open the Computer Case

- Remove the screws on the side panel (usually the left side when facing the front).
- Slide the panel off to access the motherboard.

3.) Locate the RAM Slots

- Find the RAM slots (long, thin slots next to the CPU).
- If replacing old RAM, unlock the side clips and gently remove the existing module.

4.) Align the RAM Module

- Look at the notch on the RAM stick—it should match the key in the slot.
- Hold the RAM by the edges, avoiding touching the gold contacts.

5.) Insert the RAM Module

- Place the RAM stick into the slot at a 45-degree angle (for some motherboards) or straight in.
- Firmly press down on both ends until the clips snap into place.
- You should hear a click confirming it is secure.

6.) Close the Case and Reconnect Everything

- Reattach the side panel and tighten the screws.
- Plug the power cable back in and reconnect peripherals.

7.) Power On and Check Installation

- Turn on the PC and check if the RAM is detected:
 - Windows: Open Task Manager (Ctrl + Shift + Esc) → Performance → Memory.
 - BIOS/UEFI: Enter BIOS by pressing F2, F10, or Delete at startup.

Section 5: Essay

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

– Why Is Cooling Important?

1. Prevents Overheating – Keeps components like CPU and GPU within safe temperature limits.
2. Improves Performance – Prevents thermal throttling, where the system slows down to avoid overheating.
3. Enhances Longevity – Reduces wear on components like the processor, RAM, and storage drives.
4. Maintains System Stability – Prevents random shutdowns, freezes, or blue screen errors due to excessive heat.

Types of Cooling Methods & Their Effectiveness

1.) Air Cooling (Most Common & Cost-Effective)

Effectiveness: Suitable for general use, gaming, and mid-range systems.

Example: CPU heatsinks & case fans.

- How it works: Uses heat sinks and fans to dissipate heat.
- Pros: Affordable, easy to maintain, widely available.
- Cons: Can be noisy; less effective for high-performance setups.

2.) Liquid Cooling (Advanced & High-Performance)

Effectiveness: Best for gaming PCs, workstations, and overclocked systems.

Example: AIO (All-in-One) liquid coolers & custom liquid cooling loops.

- How it works: Uses liquid coolant to absorb and transfer heat away from components.
- Pros: More efficient, quieter than air cooling.
- Cons: Expensive, requires maintenance, risk of leaks.

3.) Thermal Paste (Heat Transfer Enhancer)

Effectiveness: Essential for ensuring proper CPU cooling.

- How it works: Applied between the CPU and heatsink to fill microscopic gaps and improve heat transfer.
- Pros: Simple but crucial for efficient cooling.
- Cons: Needs to be replaced every few years for best performance.

4.) Phase-Change Cooling (Extreme Cooling)

Effectiveness: Used for extreme overclocking and high-performance computing.

- How it works: Uses refrigeration techniques to cool components below freezing.
- Pros: Unmatched cooling performance.
- Cons: Expensive, complex, not practical for everyday users.

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

– What Is Bus Width?

- In computer architecture, a bus is a communication pathway that transfers data between different components (CPU, RAM, storage, etc.).
 - Bus width refers to the number of bits that can be transmitted simultaneously.
 - It is typically measured in bits (e.g., 8-bit, 16-bit, 32-bit, 64-bit).
-

Why Is Bus Width Important?

1.) Affects Data Transfer Speed

- A wider bus allows more data to be transferred per cycle.
- Example: A 32-bit bus can transfer 4 bytes at a time, while a 64-bit bus can transfer 8 bytes, making it faster.

2.) Determines Memory Addressing

- The width of the address bus determines how much memory the CPU can access.
- Example:
 - 32-bit processors can address up to 4GB RAM ($2^{32} = 4,294,967,296$ bytes).
 - 64-bit processors can address up to 16 exabytes (theoretical limit), enabling systems to use more than 4GB RAM.

3.) Improves System Performance

- A wider bus reduces bottlenecks in data transmission, improving overall performance.
- High-performance applications (gaming, AI, video editing) benefit from larger bus widths.

4.) Impacts Peripheral Compatibility

- Different buses (PCIe, USB, SATA) have different widths affecting their speed and compatibility.
- Example: PCIe x16 bus is used for GPUs because it provides high bandwidth for fast data transfer.

Types of Buses in a Computer

Bus Type	Function	Common Widths
Data Bus	Transfers actual data	8-bit, 16-bit, 32-bit, 64-bit
Address Bus	Carries memory addresses	32-bit, 64-bit
Control Bus	Sends control signals (read/write)	Varies based on CPU

Real-World Example

32-bit vs 64-bit Processors

- A 32-bit processor with a 32-bit data bus can handle 4 bytes per cycle.
- A 64-bit processor with a 64-bit data bus can handle 8 bytes per cycle, doubling the performance potential.