Computer Workshop (CO24992)
ASSIGNMENT – 2

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Q.) Demonstration of various components of the Motherboard of a computer system and to study the functions of different components.

Ans.)

1. CPU Socket (Processor Socket):

- The CPU socket is where the processor (CPU) is installed.
- It provides electrical connections for the CPU to communicate with other components on the motherboard.
- Different motherboards support different CPU socket types (e.g., LGA, PGA), so it's important to ensure compatibility with your chosen CPU.

2. RAM Slots (Memory Slots):

- RAM slots are where the system memory (RAM) modules are installed.
- They provide the necessary connections for the RAM modules to communicate with the CPU and other components.
- Motherboards have varying numbers of RAM slots and support different types and speeds of RAM (e.g., DDR4, DDR5).

3. Expansion Slots (PCIe Slots):

- Expansion slots, typically PCIe (Peripheral Component Interconnect Express) slots, allow for the installation of expansion cards such as graphics cards, sound cards, and network cards.
- PCIe slots come in different sizes (e.g., PCIe x16, PCIe x1) to accommodate different types of expansion cards.
- They provide high-speed data transfer between expansion cards and the CPU/memory.

4. Chipset:

- The chipset is a collection of integrated circuits (chips) on the motherboard that manage communication between the CPU, memory, storage, and peripherals.
- It includes the Northbridge and Southbridge (on older motherboards) or a single chip solution (on modern motherboards).
- The chipset determines the motherboard's features and capabilities, such as USB

ports, SATA ports, and overclocking support.

5. BIOS/UEFI Chip:

- The BIOS (Basic Input/Output System) or UEFI (Unified Extensible Firmware Interface) chip stores firmware used to initialize the hardware during the boot process.
- It contains settings and configurations for the motherboard and allows users to access and modify system settings through the BIOS/UEFI setup utility.

6. Storage Connectors(SATA, M.2):

- SATA (Serial ATA) connectors provide connections for storage drives such as hard disk drives (HDDs) and solid-state drives (SSDs).
- M.2 slots provide connections for M.2 SSDs, which offer higher speeds and smaller form factors than traditional SATA drives.

7. Power Connectors:

- ATX power connector: Provides power from the power supply unit (PSU) to the motherboard.
- CPU power connector (4/8-pin EPS): Provides additional power to the CPU. **8.**

I/O Ports (Back Panel Connectors):

- Back panel connectors include ports for USB, Ethernet (LAN), audio (microphone, line-in, line-out), video (HDMI, DisplayPort), and other peripherals.
- These ports allow for connection to external devices and peripherals.

Q.) Study of working of SMPS : Different voltage levels; voltage levels used by different components of motherboard etc.

Ans.)

A Switched Mode Power Supply (SMPS), also known as a power supply unit (PSU), is an essential component of a computer system responsible for converting mains AC voltage to various DC voltages required by different components of the motherboard and other peripherals. Let's delve into how an SMPS works and the different voltage levels it provides:

Working of SMPS:

1. **Rectification:** The SMPS begins by rectifying the incoming AC voltage from the mains power supply to DC voltage using a rectifier circuit. This rectified voltage is typically around 160-325 volts DC.
2. **PFC (Power Factor Correction):** In some SMPS units, a power factor correction circuit may be employed to improve efficiency and power factor.
3. **Conversion to High-frequency AC:** The rectified DC voltage is then converted into high frequency AC voltage using a switching circuit (usually a MOSFET transistor and a transformer).

4. **Step-down and Isolation:** The high-frequency AC voltage is passed through a transformer to step down the voltage to the required levels for different components while also providing isolation from the mains supply.

5. **Rectification and Filtering:** The stepped-down AC voltage is rectified again to DC voltage and filtered to smooth out any ripples or noise.

6. **Voltage Regulation:** The filtered DC voltage is regulated to ensure stable output voltages despite variations in load or input voltage. This regulation is achieved using feedback control circuits.

7. **Multiple Output Rails:** The SMPS provides multiple output rails with different voltage levels to power various components of the computer system.

Voltage Levels Used by Different Components of Motherboard:

1. +12V Rail:

- Used by components such as CPU (for CPU power), GPU (for graphics card power), and other high-power peripherals.
- It provides power to the CPU socket, PCIe slots, and EPS power connector. 2.

+5V Rail:

- Historically used by older components like IDE drives, PCI cards, and USB ports.
- Modern motherboards use +5V for powering some components on the motherboard and peripherals like USB ports.

3. +3.3V Rail:

- Used by components such as RAM, chipset, and some CPU power circuits.
- Provides power to DDR memory modules, chipset, and some other low-power components on the motherboard.

4. -12V Rail:

- Used for legacy components such as RS-232 serial ports and some audio circuits. •

Its usage is minimal in modern motherboards.

5. Standby Voltage (typically +5V or +3.3V):

- Provides power to certain components even when the computer is in standby or powered off state.
- Used for features like Wake-on-LAN, power buttons, and USB charging.

Q.) What are the different types of motherboard sockets? (Front panel & back panel ports)

Ans.)

Front Panel Ports:

1. USB (Universal Serial Bus) Header:

- These headers allow for connecting USB ports located on the front panel of the computer case.
- USB headers support different versions, such as USB 2.0 and USB 3.0/3.1/3.2 Gen 1/Gen 2, providing different data transfer speeds.

2. Audio Header:

- Audio headers are used to connect front panel audio jacks, including headphone and microphone ports, to the motherboard's onboard audio chipset.

3. Power Button/Header:

- The power button/header connects the power button on the front panel of the case to the motherboard, allowing users to power on or off the system.

4. Reset Button/Header:

- The reset button/header connects the reset button on the front panel of the case to the motherboard, enabling users to reset the system.

5. LED Headers (Power LED, HDD LED):

- LED headers connect indicator lights (such as power LED and HDD activity LED) on the front panel of the case to the motherboard, providing visual feedback on system status.

6. Other Headers:

- Some motherboards may feature additional front panel headers for functionalities like USB Type-C ports, RGB lighting, or other custom case features.

Back Panel Ports:

1. USB Ports:

- USB ports on the back panel allow for connecting various USB devices such as keyboards, mice, printers, and external storage devices.

2. Ethernet Port (LAN Port):

- The Ethernet port provides a connection for a wired network, allowing for internet connectivity.

3. Audio Ports:

- Back panel audio ports include speaker, line-in, line-out, and microphone jacks, providing connectivity for audio input and output devices.

4. Video Ports:

- Depending on the motherboard and integrated graphics capabilities, back panel video ports may include HDMI, DisplayPort, DVI, or VGA ports for connecting monitors and displays.

5. PS/2 Ports:

- PS/2 ports are used for connecting legacy keyboard and mouse devices, though they are less common on modern motherboards.

6. Other Ports:

- Other ports may include legacy serial ports, parallel ports, eSATA ports, Thunderbolt ports, or additional USB ports, depending on the motherboard's features and specifications.

Q.) Define these terms: 1. SATA 2.PCI 3.AGP 4.CMOS 5.BIOS

Ans.)

SATA (Serial ATA): SATA is a computer bus interface used for connecting storage devices like hard disk drives (HDDs) and solid-state drives (SSDs) to the motherboard. It offers faster data transfer rates and improved cable management compared to older interfaces like PATA.

PCI (Peripheral Component Interconnect): PCI is a standard for connecting expansion cards to the motherboard. It accommodates various cards like sound cards, network adapters, and graphics cards. Newer versions like PCIe offer higher data transfer rates and performance.

AGP (Accelerated Graphics Port): AGP was a dedicated interface for connecting graphics cards to the motherboard, providing faster data transfer rates than standard PCI slots. It has been largely replaced by PCIe for improved performance and scalability.

CMOS (Complementary Metal-Oxide-Semiconductor): CMOS technology is used in integrated circuits, particularly in the motherboard's BIOS/UEFI chip. The CMOS battery powers the BIOS/UEFI chip to retain system settings when the computer is off, including date and time, boot order, and hardware configurations.

BIOS (Basic Input/Output System): BIOS is firmware used to initialize hardware components during the boot process. It performs tasks like the Power-On Self-Test (POST) and loading the operating system. BIOS has largely been replaced by UEFI, offering additional features and improvements.