Practical 3: Identify and Understand the Working of Various Ports, Sockets, Connectors, Cables & Expansion Cards

A computer system uses several ports, sockets, connectors, and cables to communicate with internal and external devices. These interfaces help transfer data, power, audio, video, and signals between components. In this practical, we identify different types of ports and expansion cards and understand their functions and working.

Various Types of Ports and Their Working

Ports are external connecting points on a computer used to connect devices.

(A) USB Ports (Universal Serial Bus)

Use:

- Connect keyboard, mouse, pen drive, printer, camera, external HDD, etc.

Types:

- USB 2.0 (Black – moderate speed)
- USB 3.0 / 3.1 (Blue – high speed)
- USB-C (Reversible, very high speed)

Working:
USB ports transfer data and sometimes power between the computer and connected device.

HDMI Port (High Definition Multimedia Interface)

Use:

- For connecting monitor, TV, or projector.

Working:
Transfers high-definition digital video and audio signals.

(C) VGA Port

Use:

- Connecting older monitors and projectors.

Working:
Transfers analog video signals.

(D) DisplayPort (DP)

Use:

- High-resolution monitors, gaming displays.

Working:
Transfers digital video & audio at very high bandwidth.

(E) Ethernet (LAN) Port – RJ-45

Use:

- For wired internet or network connection.

Working:
Transfers data packets between computer and network at high speed.

(F) Audio Ports (3.5 mm)

Types:

- Green → Speaker/Headphone
- Pink → Microphone

- Blue → Line-In

Working:
Transfers analog audio input/output signals.

(G) PS/2 Ports

Use:

- Older keyboard (purple) and mouse (green).

Working:
Carries simple input signals.

(H) Thunderbolt Port

Use:

- Very high-speed data transfer, external GPUs, monitors.

Working:
Uses PCIe and DisplayPort technology for fast communication.

(I) Power Port (PSU)

Use:

- To provide electrical power to the computer via SMPS.

Working:
Carries AC power into the PSU, which is converted to DC.

Sockets and Connectors

(A) CPU Socket

Use:

- Mounting the processor (CPU) on the motherboard.

Working:
Provides electrical contacts for communication between the CPU and motherboard.

(B) RAM Slot (DIMM Slot)

Use:

- Insert RAM sticks.

Working:
Allows the CPU to access temporary memory for processing.

(C) SATA Connectors

Use:

- Connect HDDs, SSDs, and DVD drives.

Working:
Transfers data between the storage device and motherboard chipset.

(D) M.2 Slot

Use:

- Install M.2 SSDs (SATA or NVMe).

Working:
Transfers high-speed data using PCIe lanes.

(E) PCI Express Slot (Internal Connector)

Use:

- For expansion cards like GPU, network card, sound card.

Working:
Provides high-speed communication using PCIe lanes.

(F) Power Connectors

Types:

- 24-pin ATX → Main power to motherboard
- 4/8-pin CPU power → Power to processor
- SATA power connector → Power to HDD/SSD
- PCIe power connectors → Power to graphics cards

Working:
Provide regulated DC electricity to components.

Cables and Their Functions

(A) HDMI Cable

- Transfers digital video & audio.

(B) VGA Cable

- Carries analog video.

(C) USB Cable

- Transfers data and power between devices.

(D) SATA Data Cable

- Connects HDD/SSD to motherboard.

(E) SATA Power Cable

- Supplies power from SMPS to storage devices.

(F) Ethernet Cable (RJ-45)

- Connects computer to router or network switch.

(G) Power Cable

- Connects PSU to wall socket.

Types of Expansion Cards and Their Working

Expansion cards add extra features to a computer. They are inserted into PCIe slots.

(A) Graphics Card (GPU)

Use:

- High-quality video output, gaming, rendering.

Working:
Processes graphics data and sends it to display devices.

(B) Network Interface Card (NIC)

Use:

- Connects computer to network or internet.

Working:
Handles data packet transmission and reception.

(C) Sound Card

Use:

- Improves audio input/output quality.

Working:
Processes sound signals for speakers, microphones, and audio devices.

(D) WiFi/Bluetooth Card

Use:

- Wireless connectivity for WiFi and Bluetooth devices.

Working:
Uses radio signals to communicate with routers or Bluetooth gadgets.

(E) TV Tuner Card

Use:

- Allows computer to receive TV signals.

Working:
Converts broadcast signals into digital format.

(F) RAID Card

Use:

- Used for connecting multiple storage devices in RAID configuration.

Working:
Handles data protection and performance enhancement for storage arrays.