Practical - 1

Aim -

Introduction to Raspberry Pi 5 Model B and its components

Theory -

The Raspberry Pi 5 Model B is a powerful, credit-card-sized single-board computer. It features a quad-core processor, GPU, RAM options, and onboard wireless connectivity. This device runs a Linux-based OS (like Raspberry Pi OS) and is suitable for IoT projects. It includes GPIO (General Purpose Input/Output) pins to interface with sensors and actuators. USB 3.0 ports, HDMI, camera ports, and Ethernet make it a versatile tool for developers. The 40-pin GPIO header allows integration with external components and hardware modules. It supports various programming languages like Python, C/C++, and Java. Students learn to boot the OS, explore the desktop interface, and access the terminal. Familiarity with the Pi helps in creating projects involving sensors, displays, and more. Understanding its components is foundational to building smart systems in IoT.

Features:

- The Raspberry Pi 5 Model B is a single-board computer developed for educational and IoT prototyping purposes.

- It features a **64-bit quad-core ARM Cortex-A76 processor**, clocked at up to 2.4 GHz.

- The device supports **4GB or 8GB RAM**, offering sufficient memory for multitasking and edge computing.

- The board includes **USB 3.0, HDMI, Gigabit Ethernet**, and **PCIe support**.

- Built-in **Wi-Fi 5 (802.11ac)** and **Bluetooth 5.0** make it suitable for wireless IoT applications.

Components and Interfaces:

- **GPIO (40-pin):** Used to connect and control hardware like LEDs, sensors, and motors.

- **HDMI Ports:** For display output (dual micro-HDMI).

- **USB Ports:** Interface for peripherals like keyboard, mouse, or USB sensors.

- **CSI & DSI ports:** For connecting camera and display modules.

- **MicroSD Card Slot:** Used to boot the OS and store files.

- **Power Supply:** Typically 5V/5A via USB-C.

Applications in IoT:

● Data logging, automation, environmental monitoring, home automation, etc.

● Can run full Linux OS (e.g., Raspberry Pi OS), making it flexible for development.