LEVEL B — MCU ARCHITECTURE & DATASHEETS

B.1 Microcontroller Fundamentals

1. **General MCU Architecture**
    - **Core**: CPU (ARM Cortex-M, PIC18, 8051, etc.).
    - **Memory**: Flash (program), SRAM (data), EEPROM (non-volatile small storage).
    - **Buses**: AHB, APB, system buses connecting peripherals.
    - **Peripherals**: GPIO, UART, I²C, SPI, Timers, ADC/DAC.
    - **Clocks & Reset**: Oscillators, PLL, watchdog reset.
2. **Instruction Set Basics**
    - **RISC (ARM Cortex-M, RISC-V)** vs **CISC (8051, PIC18)**.
    - Harvard vs Von Neumann architecture.
3. **Registers & Memory Mapping**
    - Every peripheral is controlled by registers at fixed memory addresses.
    - Example: 0x40020000 for GPIO base in STM32.

B.2 Datasheet & Reference Manual Reading

1. **Datasheet** (short, 50–100 pages) → highlights:
    - Pin configuration.
    - Electrical specs (voltage, current, power).
    - Maximum ratings (important to avoid damage).
    - Peripheral list.
2. **Reference Manual** (big, 1000+ pages) → details:
    - Register descriptions.
    - Functional blocks (timers, UART, ADC).
    - Clock tree diagrams.

- **Practical**

1. **MCU Chosen**: STM32F103 (Blue Pill board) or PIC18F4520 (since you already worked on them).
2. **Task**:
    - Download STM32F103 datasheet + reference manual.
    - Identify:
        - Supply voltage range.
        - Flash/RAM size.
        - GPIO pin alternate functions.