Practical No. 3

Aim: Addition of Two 8-bit Numbers (Sum 8-bit)

Objective: To perform the addition of two 8-bit numbers and obtain an 8-bit sum.

Theory:

In digital electronics and microprocessors, an 8-bit addition is a fundamental arithmetic operation performed using registers and the ALU (Arithmetic Logic Unit). In an 8-bit system, numbers range from 00H (0 in decimal) to FFH (255 in decimal). The sum of two 8-bit numbers is also expected to be within this range; otherwise, an overflow occurs.

Addition is performed using a simple binary addition process where:

- 0 + 0 = 0
- 0 + 1 = 1
- 1 + 0 = 1
- 1 + 1 = 10 (sum = 0, carry = 1)

This operation can be implemented using a microcontroller, assembly language, or high-level programming languages.

Materials/Tools Required:

- Microprocessor/microcontroller (e.g., 8085/8051)
- Assembler/Simulator
- Computer system with programming software
- Binary calculator (optional)

Procedure:

1. **Initialize Registers**: Load two 8-bit numbers into registers (e.g., A and B in an 8085 microprocessor).
2. **Perform Addition**: Use the ADD instruction to add the two numbers.
3. **Store the Result**: The sum is stored in a register (A register in an 8085 processor).
4. **Check for Carry**: If the sum exceeds 8-bit storage (greater than FFH), a carry flag is set.
5. **Display the Result**: The sum is displayed on an output device or stored in memory for further processing.

Observations:

- Addition of small 8-bit numbers results in an 8-bit sum.
- If the sum exceeds 255 (FFH in hexadecimal), a carry flag is set, indicating an overflow.
- The processor handles the carry using a separate flag register.

Conclusion:

The addition of two 8-bit numbers is performed successfully, and the result is stored within an 8-bit register unless an overflow occurs. If the sum exceeds 8 bits, the carry flag is used to indicate overflow.

Applications (Optional):

- Used in microcontroller-based arithmetic operations.
- Fundamental operation in digital circuits, including ALU operations.
- Applied in embedded systems for performing simple arithmetic tasks.