**Practical No. 10**

**Title:** Sum of a Series of 8-bit Numbers

**Objective:** To calculate the sum of a series of 8-bit numbers using a microprocessor/microcontroller.

**Theory:**

Summing a series of 8-bit numbers involves:

1. **Loading each number** from the series.
2. **Adding it to an accumulator** register (e.g., A register in an 8085 microprocessor).
3. **Handling Carry Flag (CY)** in case the sum exceeds 8-bit capacity (255 in decimal or FFH in hexadecimal).

**Example (Adding Five 8-bit Numbers in Binary):**

Numbers:  
{ 00001100 (12), 00010110 (22), 00100001 (33), 00011111 (31), 00001111 (15) }

**Step-by-Step Addition:**

00001100 (12)

+ 00010110 (22)

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00100010 (34)

+ 00100001 (33)

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01000011 (67)

+ 00011111 (31)

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01100010 (98)

+ 00001111 (15)

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01110001(113) → Final sum

If the sum exceeds **FFH (255 in decimal)**, the Carry Flag (CY) is set, and an additional memory location is needed to store the overflow.

**Materials/Tools Required:**

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

**Procedure:**

1. **Initialize Registers:**
   * Load the first number into the accumulator (A register).
   * Set a counter for the number of elements.
2. **Add Each Number:**
   * Load the next number from the series into a temporary register (e.g., B register).
   * Perform the addition (ADD B).
   * Check for Carry Flag (CY).
     + If **CY = 1**, increment a separate memory location for higher byte storage.
3. **Repeat the Process:**
   * Continue until all numbers are added.
4. **Store and Display the Sum:**
   * Store the final sum in memory.
   * If the sum exceeds 8-bit capacity, handle overflow using an additional register/memory.

**Observations:**

* The sum is correctly computed within an 8-bit range.
* If the total sum exceeds **255 (FFH)**, an overflow occurs, requiring additional storage.
* The Carry Flag (CY) helps detect overflow in multi-byte operations.

**Conclusion:**

The sum of a series of 8-bit numbers is successfully calculated using an iterative addition process. Overflow is managed by checking the Carry Flag and using additional memory if needed.

**Applications :**

* Used in microprocessors for cumulative data processing.
* Essential in digital signal processing for summing sensor values.
* Applied in real-time embedded systems for tracking cumulative data like scores, counters, and statistics.