

**LBB2**

**AIM:** Introduction to programming. To use and appreciate the "data-transfer" and "data-manipulation" instructions.

A microprocessor may be thought of as a device which accepts binary coded information from its 'input-ports', manipulates this information according to a program in its memory and outputs the results to its 'output-ports'. The instructions which constitute the program are some or all of those from the 'instruction-set' of the particular microprocessor; required to perform a particular task.

**Instructions:**

Instructions of any microprocessor may in general be divided into five groups.

- a) Data Transfer.
- b) Data Manipulation.
- c) Transfer of Control.
- d) Input/Output.
- e) Machine Control.

In this lab, we shall look at the Data-Transfer and Data-Manipulation group.

**Data-Transfer:**

This involves data transfer between the various processor registers or between a processor register and memory location.

```

e.g.  MVI A, data      ;(A)←-data
      MOV A,B        ;(A)←-(B)
      LXI H,802D     ;(H)(L)←-802D(hex)
                        ;So H contains 80 and L 2D.
      MOV A,M        ;(A)←--((H)(L))
  
```

This means that the contents of the memory location whose address is given by the contents of H and L registers is sent to A.

**Data-Manipulation:**

Instructions in this group carry out arithmetic and logical operations on data in registers or memory locations.

```

e.g.  ADD B          ;(A)←-(A)+(B)
      SUB C          ;(A)←-(A)-(C)
      ADI data       ;logical "AND" (A) and data.
      DCR M          ;((H)(L))←-- ((H)(L))-1
      ADC B          ;(A)←-- (A)+(B)+(CY)
  
```

**EXPT. 1**

Write a program that reads three 8-bit numbers from memory, adds the first two and subtracts the third one from the sum of the first two and then stores the result in memory.

Run this program for several values.

**EXPT. 2:**

Write a program that adds 2 numbers in double precision arithmetic (this means that 16-bits are used for numerical values instead of 8). The numbers are contained in register pairs BC and DE. Check your result for several values.

Would you get the correct answer if the first two values were E6 and 2A. Explain.

\*\*\*Take care of the carry that results, since only 8-bit addition is carried out in the accumulator.

Follow the format below to code your program.

MEMORY Address	Data	Label:	ASSEMBLY	
			Mnemonic	Operands : Comments

\*\*\*You are encouraged to choose any appropriate instruction from the instruction set and experiment with them.

For queries consult Assignment 3-6 of the MAT385 VOL1.