Lab # 01

Program Structure and Arithmetic Operations using Assembly Language Program in EMU8086.

Objective:

Getting familiar with Program Structure and Arithmetic operations using Assembly Language Program in EMU8086.

Theory:

- **Data Transfer Instructions:**

  Registers (Direct): Move contents of BX register to AX register
  > MOV AX, BX

  Direct: Move contents of the variable labeled COUNT to AX register

  > MOV AX, COUNT

  Immediate: Load CX register with the value 240d
  > MOV CX, 00F0H
  > MOV CX, 240d

  Memory: Load CX register with the value at address 240
  > MOV CX, [0F0H]

  Registers (Indirect): Move contents of AL register to memory location in BX
  > MOV [BX], AL

- **Arithmetic / Logic Instructions:**

  Arithmetic and logic instructions can be performed on 8-bit (byte) and 16-bit values. The first operand has to be a register and the result is stored in that register.

  Increment the contents of BX register by 4
  > ADD BX, 4

  Add the contents of AX register with the contents of CX register
  > ADD AX, CX

  Subtract 1 from the contents of AL register
  > SUB AL, 1

  Subtract the contents of CX register from the contents of DX register
  > SUB DX, CX

  Multiply AL by BL, the result will be in AX
  > MUL BL

  Divide the contents of AX register with the value of CL and store the result in AX
  > DIV CL

  Increase or decrease the contents of BX register by 1
  > INC BX   ; Increase
  > DEC BX   ; Decrease

  Compare (subtract and set flags of flag register but without storing result)
  > CMP AX, 0054H

  Clear the contents of AX register
  > XOR AX, AX

  Negation of a register value
  > NEG AX

Assembly Language Program Skeleton:

```
ORG 0100h
.DATA          ; Data Segment Starts
A DW 11
B DW 4
SUM DW ?
DIFFERENCE DW ?
MULTIPLICATION DW ?
DIVISION DW ?

.CODE          ; Code Segment Starts

MAIN PROC      ; Initialize Data Segment

   MOV AX, @DATA
   MOV DS, AX
…
…
    MAIN ENDP          ; End Procedure
END MAIN              ; End MAIN
RET                   ; Return to DOS
```

Tasks to do:

1. Write an appropriate assembly language code to accomplish the following tasks (use as many as possible arithmetic instructions with less number of registers):

   a. Convert $260°$ C (Celsius) to F (Fahrenheit) using the following expression and store in a variable F:
   $$°F = °C \times 9/5 + 32 - 1$$

   b. Convert 1000 $°F$ (Fahrenheit) to $°C$ (Celsius) using the following expression and store in a variable C:
   $$°C = (°F - 32) \times 5/9 + 1$$