LAB # 3

MAIN PROGRAM AND SUBROUTINE USING PIC18F ASSEMBLY

1. **Title:** Write a main program and subroutine in PIC18F assembly language.

2. **Objective:**
   The purpose of this lab is to:
   - write a main program and a subroutine in PIC18F assembly language.
   - assemble and debug the main program and the subroutine using Microchip's MBLAB assembler/debugger.
   - demonstrate using the MPLAB how the hardware stack pointer (STKPTR) changes with the execution of the PIC18F CALL and RETURN instructions.

3. **Prelab:**
   It is desired to write a subroutine in PIC18F assembly language to compute

$$Z = X1 + X2 + X3 + …….. + X8$$

   Assume the X_i's are unsigned 8-bit and stored in consecutive locations starting at 0x50. Assume FSR1 points to the Xi's. Also, write the main program in PIC18F assembly language to perform all initializations (FSR1 to 0x30, STKPTR to 5), call the subroutine, and then compute $Z/8$. Discard the remainder.

   (a) Flowchart the problem.

   (b) Convert the flowchart to PIC18F assembly language program.

4. **Equipment, Software, and Components required:**

   Microchip'sMPLAB assembler /Debugger

5. **Description (corresponding topics covered in the textbook):**

This lab utilizes a pointer, FSR1 to point to *Xi*'s. A subroutine is written in PIC18F assembly language which uses a loop to compute the summation of 8 numbers. The main program is also written in PIC18F assembly language which uses the hardware the stack pointer (STKPTR) to call the subroutine. (Example 7.3, Pages 173-177

Prerequisites:

Stack Pointer register (Pages 27-96), Subroutine Calls in assembly language (Page 74), Section 7.4 (Pages 168-170)

Procedure:

i) Assemble and verify the PIC18F assembly language programs for the main program and the subroutine of part (b) using the MPLAB.

ii) Demonstrate using the MPLAB how the hardware stack pointer (STKPTR) changes with the execution of the PIC18F CALL and RETURN instructions.

6. **Deliverables:**

i)   Postlab

Write a subroutine in PIC18F assembly language at address 0x200 to compute $(X^4/4)$ where X is an unsigned 8-bit number. Also, write the main program at address 0x100 in PIC18F assembly language that will initialize FSR0 to 0x0070, X is to arbitrary data, initialize STKPTR to 0x10, call the subroutine to compute $(X^4/4)$, and then push 8-bit result onto the software stackpointer pointed to by FSR0

ii)   Lab report

Submit a final Lab report (Staple Signed prelaband typedpostlabat the end of the quarter or semester).

8.Concluding remarks:

- Complete each prelab before coming to the lab. Please get it signed.