

**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

$$Z = X1 + X2 + X3 + \dots + X8$$

Assume the  $X_i$ 's are unsigned 8-bit and stored in consecutive locations starting at 0x50. Assume FSR1 points to the  $X_i$ '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's MPLAB assembler /Debugger

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

This lab utilizes a pointer, FSR1 to point to  $X$ '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 prelab and typed postlab at the end of the quarter or semester).

**8. Concluding remarks:**

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