

ECE 425 Introductions to Microprocessors Laboratory Work 4

Objective:

- 1) New assembly commands.
- 2) Use of delay segments in assembly programs.
- 3) Conditional loops.

Preparation:

Write a preparation report for the following items.

- 1) Explain the use of the following commands shortly.
 - a) decfsz F, D
 - b) decf F, D
 - c) incfsz F, D
 - d) incf F, D
 - e) sublw K
 - f) subwf F, D
 - g) rrf F, D
 - f) rlf F, D
 - i) comf F, D
- 2) What is a subroutine? Explain it in a sentence. Review your knowledge about subroutine. How many registers are available in stack? How do we call a subroutine? What happens to the stack registers when a subroutine is called?
- 3) Compute the delay amount created by the following program segment. Assume that 4MHz oscillator is used.

```
LIST P=16F84A
INCLUDE "P16f84A.INC"

__config __CP_OFF&_WDT_OFF&_XT_OSC

Counter_Outer      equ    0x0C ; free RAM location 12
Counter_Inner      equ    0x0D ; free RAM location 13
N                  equ    .255 ; decimal constant 255

movlw N;
movwf Counter_Outer;
movwf Counter_Inner;

Loop_Outer
    movwf Counter_Inner;

        Loop_Inner
            decfsz Counter_Inner, F;
            goto Loop_Inner;

        decfsz Counter_Outer, F;
        goto Loop_Outer;

end
```

- 4) Write 1msec delay segment for 4MHz oscillators.
- 5) Write a 0.2sec delay segment for 4MHz oscillator.
- 6) Using subroutine concept write a 0.8sec delay subroutine using the delay segment written in the previous step.
- 7) Write assembly programs for the following tasks,

Program1) If the button connected to RA0 is pressed 10 times the LED connected to RB0 is turned ON for 2secs and then turned OFF.

Program2) The LEDs connected to PORTB pins are turned on and turned off in a sequential manner with 0.8sec time intervals.

Program3) The first 4 LEDs connected to PORTB pins are turned on for 0.8sec and turned off then the next 4 LEDs connected to PORTB pins are turned on for 0.8sec and turned off and so on.

Laboratory Work:

- 1) Write and test all the programs you wrote in preparation step-7. See the result of your programs on experiment card.

During your LAB work show every step that you complete to the LAB assistant. Get a copy of assembly files you write during the LAB hour via a flash disk for future reference.