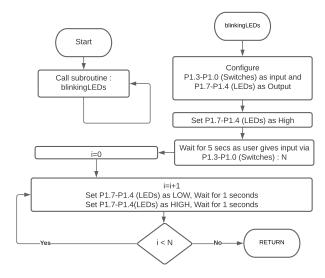
Lab 4: 20 points Date: Feb 15, 2021

- 1. [10 points] In this experiment, you will learn to display content on the LCD connected to the Pt-51 kit. Download the lcd.asm file and lcd-control-made-easy.pdf from Moodle. The latter has general information about LCD operation which is helpful in understanding the code in lcd.asm.
 - Compile 1cd.asm and load the hex file on to the kit. Make sure the output on the LCD screen is as shown below:

- Modify lcd.asm to display "EE337-2021-S1" on the first line and your first name on the second line (truncate to 16 characters if you have a longer name). Pad the display lines with spaces such that these are centered on the LCD when displayed. You should load and run this program on the Pt-51 kit.
- 2. [10 points] Write a subroutine blinking LEDs which works as shown in the flowchart below. After configuring the port pins P1.3-P1.0 as inputs and port pins P1.7-P1.4 as outputs, the subroutine turns 'On' the LEDs on port pins P1.7-P1.4 on for 5 seconds. During this time, the user gives a nibble input via the switches connected to port pins P1.3-P1.0. This input controls the number of times (N) that the group of LEDs P1.7-P1.4 blink. Here, a blink represents LED 'Off' for 1 s followed by 'On' for 1 s. The value of N can vary between 1 to 15.

Example: After the initial 5 seconds elapse, if the user sets P1.3-P1.0 as 0011 (i.e., N=3), then the group of LEDs P1.7-P1.4 go through a sequence of 'Off-On' transitions thrice, each with a 2 second period.



TA Checkpoints

- 1. For question 1, check that the desired string appears in the LCD (Course section, first name). Also, check that the string is centered in the LCD.
- 2. For question 2, ask the student to give the nibble input 1010 and check that the four LEDs are blinking 10 times. Check that the subroutine blinkingLEDs is running indefinitely by asking the student to change the state of the switches again during the 5 second "all LEDs on" state.