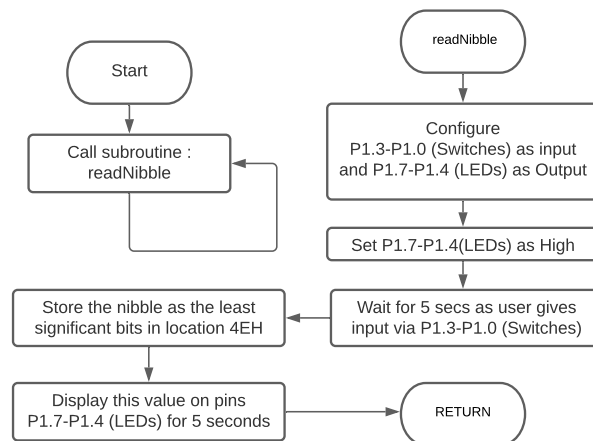


- [10 points] In this experiment, you will learn to display content on the LCD connected to the Pt-51 kit. Download the `lcd.asm` file and `lcd-control-made-easy.pdf` from Moodle. The latter has general information about LCD operation which is helpful in understanding the code in `lcd.asm`.

- Compile `lcd.asm` and load the hex file on to the kit. Make sure the output on the LCD screen is as shown below:

Pt-51
IIT Bombay

- Modify `lcd.asm` to display “EE337-2021-S2” 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.
- [10 points] Write a subroutine `readNibble` 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. After the 5 seconds elapse, store the nibble as the least significant bits in location 4EH and display this value on pins P1.7-P1.4 (LEDs) for 5 seconds.



TA Checkpoints

- 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.
- For question 2, ask the student to give the nibble input 1010 and check that two of the four LEDs are blinking. Check that the subroutine `readNibble` is running indefinitely by asking the student to change the state of the switches again during the 5 second “all LEDs on” state.