University of Jordan
School of Engineering
Department of Mechatronics Engineering
Microprocessor and Microcontroller Laboratory
0908432
Introduction to the Lab

Administrative Policy of the Laboratory

1) You are not allowed to smoke, eat, or drink in the Laboratory. You are expected to conduct yourself professionally, and to keep your bench area *clean* and *neat*.

2) MX432 is a time controlled closed lab, therefore, you are expected to *build* and *test* your circuit in the lab within the allotted time. You cannot build the circuit ahead of time. However, make sure to solve and bring all prelab material before hand.

3) Lab reports must be submitted at the beginning of the next experiment only. No reports will be accepted after that time.

4) You can discuss the experiment and the results with your colleagues, but each student must submit her/his own personally written report. Cheating and copying of reports is strictly prohibited and will be taken very seriously. The student will earn a **ZERO** in the lab when caught.

5) All questions should be solved in order. Moreover, each student is expected to demonstrate her/his solution fully and clearly whenever required.

6) No one can leave the lab until she/he has cleaned and arranged her/his bench and turned off the PC she/he used.

7) Always ask your instructor to check your setup before turning the power on.

8) The above mentioned polices should be strictly followed. Note that disregarding any of the rules above will seriously affect your grade!

9) **Makeup Midterm**: There will be no make-up for the midterm. In case of medical/ or other disabling emergencies, the instructor should be notified before the midterm and his approval for missing the midterm should be obtained before the midterm. If for any reason the instructor could not be reached, the department secretary should be notified before the midterm. The phone number is 535-5000 Extension 23025

10) Grading Corrections: Ask the instructor for any grading correction requests within a week of returning the report/exam/quiz papers. After that, your grade will not be adjusted. If you find any mistake in grading, please let the instructor know. Your grade will not be lowered.

11) Class Attendance: Class attendance will be taken. University regulations regarding attendance will be strictly enforced.

Prelab and Report Instructions:

- ✓ Some experiments contain requirements that need to be prepared before coming to the lab.

- ✓ You are required to prepare all prelab work before the beginning of the lab session. For the written questions you are required to write the solutions on separate sheet. **Remember** no copying from other student is allowed.

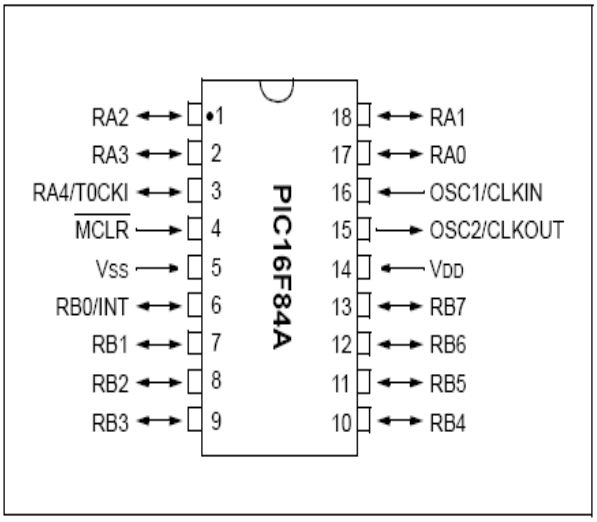
- ✓ For any questions, you can submit your questions to the instructor using email. The instructor's emails are as follows:

  Dr. Musa Alyaman: m.alyaman@ju.edu.jo

  Eng. Hisham Hatem hishamhatem89@gmail.com

  Please make sure to put in the subject line of your email message your full name and your lab session number for identification.

PIC16F84A 8-bit Microcontroller



Important PIC16F84 Features:

- Only 35 single word instructions
- Operating speed: DC - 20 MHz clock input
- 1024 words of program memory
- 14-bit wide instruction words
- 8-bit wide data bytes
- 15 Special Function Hardware registers
- Eight-level deep hardware stack
- 13 I/O pins with individual direction control
- High current sink/source for direct LED drive
- 10,000 erase/write cycles Enhanced FLASH Program memory typical
- Low power, high speed technology

Mechanical Switch De-bouncing

The push-button switches are often used to provide input to digital systems. However, mechanical switches do not open or close cleanly. When a switch is pressed it makes and breaks contacts several times before settling into its final position. This causes several transitions or "bounces" to occur. To correct this situation a de-bounce circuit is connected to the switches, thus removing the series of pulses generated by the mechanical action of the switch.

The most basic circuit used to de-bounce a switch is shown below. It consists of a resistor and a capacitor in series. The resistor and capacitor values must be chosen such that the RC time constant is greater than the bounce time.