

COMP ENG 2DX3

Pre-lab #5

Instructor: Dr. Haddara/Athar/Doyle

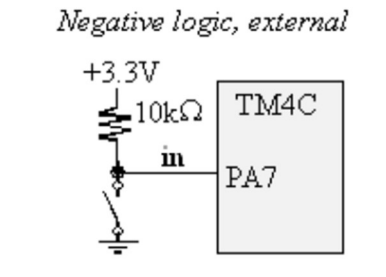
Abaan Khan – khana454 - 400428399
Someshwar Ganesan – ganesans - 400430923

As a future member of the engineering profession, the student is responsible for performing the required work in an honest manner, without plagiarism and cheating. Submitting this work with my name and student number is a statement and understanding that this work is my own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario. Submitted by [**Someshwar Ganesan, ganesans, 400430923**]

As a future member of the engineering profession, the student is responsible for performing the required work in an honest manner, without plagiarism and cheating. Submitting this work with my name and student number is a statement and understanding that this work is my own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario. Submitted by [**Abaan Khan, khana454, 400428399**]

Q1 Referring to textbook section 4.2.2, figure 4.12, from a programmer's perspective explain how the two states of the switch (open, closed) work for negative logic, external. You may assume the port pin is fully pre-configured as an input.

Ans:



When the button is not pressed (switch is open), all current from the 3.3V source, goes into the microcontroller, which means a logic HI goes into the input. When the button is pressed (switch is closed), all the current goes to ground through the switch and the microcontroller input receives a logic LO.

This layout is the same as an Active Low configuration.

Q2 Review textbook figure 8.15. This figure illustrates an electrical structure similar to the lab's Grayhill 96BB2-006-F 4x4 keypad. From the figure, determine if the switches are configured as:

- (a) positive logic, external
- (b) negative logic, external

Ans:

All the switches are configured as negative logic, external

Q3) Create a flowchart for a program that scans the 4x4 keypad using 4-output and 4-input GPIO pins and identifies which single button has been pressed (assume only one can be pressed at a time)

Ans:

