

# COMP ENG 2DX3

## Pre-lab #1

Instructor: Dr. Haddara/Athar/Doyle

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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**]

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**Q1) Record the exact name of the reference documentation for:**

- (a) the core processing unit and its operation codes/language for the MSP432E401Y.
- (b) the microprocessor logic systems and peripherals for the MSP432E401Y.

**Ans:**

- (a) Cortex - M3/M4F Instruction Set Technical User's Manual
- (b) MSP432E4 SimpleLink Microcontrollers - Technical Reference Manual

**Q2) Briefly explain the relationship between machine language, op code, and mnemonic with an example.**

**Ans:**

Machine language is the lowest-level programming language that a computer understands. It consists of binary code, which is a series of 0s and 1s.

An op-code or an operation code is a binary code that represents the basic operations or commands such as Start, Stop, Add, and Save, which the computer executes.

Mnemonics are human-readable representations of op-codes. They are used to make machine language more programmer friendly.

**Q3) In relation to the MSP432E401Y board, what core processor is used and define its registers (purpose and number of bits).**

**Ans:**

The core processor used in the MSP432E401Y board is the Cortex M4F Microprocessor. This processor has the following 32-bit registers (Bit 0 to Bit 31):

- 13 general-purpose registers (R0 to R12)
  - a) Low registers (R0 to R7) are accessible by all instructions (instructions that specify a general-purpose register)
  - b) High registers (R8 to R12) are accessible by all 32-bit instructions that specify a general-purpose register. Registers R8 to R12 are not accessible by all 16-bit instructions.
- Stack Pointer SP (R13).
- Link register LR (R14). Holds the return address of the current instruction.
- Program Counter PC (R15). Holds address of next instruction in line.
- Special-purpose Program Status Registers

**Q4) Create a flow chart showing the steps to configure GPIO port M on the MSP432E401Y. For each step of configuring a GPIO port, define the relevant register's purpose.**

**Ans:**

