

# COE 205 Computer Organization & Assembly Language – Spring 2005

**Assignment:** #1 - Introduction to Computer Organization and Data Representation

**Professor:** Muhamed Mudawar

**Due Date:** Tuesday, March 1, 2005

- Q1. (2 pts) Describe the functionality of the Program Counter (PC), the Instruction Register (IR), the Memory Address Register (MAR), and the Memory Data Register (MDR).
- Q2. (2 pts) List and briefly describe the tools used by the assembly language programmer.
- Q3. (1 pt) Define the term *bus* and why buses are used in computers.
- Q4. (2 pts) Represent the following numbers in binary, octal, and hexadecimal.
- a) 2345.5
  - b) 149.625
- Q5. (3 pts) Perform the following arithmetic operations using the designated bases and verify your result by converting the numbers and performing the operation in decimal:
- a)  $(10110110)_2 + (10111)_2$
  - b)  $(713)_8 + (167)_8$
  - c)  $(C0E)_{16} + (13B)_{16}$
- Q6. (3 pts) Express the following numbers in sign-magnitude, 1's complement, and 2's complement notations, using 8-bit representation:
- a) -101
  - b) -45
- Q7. (3 pts) Perform the following operations twice, once for a sign-magnitude notation and once for 2's complement notation, assuming 4-bit representation of numbers. Indicate in your answer when an overflow occurs:
- a)  $0101 + 1111$
  - b)  $1011 - 0111$
- Q8. (2 pts) Using 8-bit registers, give the following in both binary and decimal:
- a) The maximum unsigned number that can be stored.
  - b) The smallest negative number and the largest positive number that can be stored using sign-magnitude notation.
  - c) The smallest negative number and the largest positive number that can be stored using 2's complement notation.
- Q9. (2 pts) If you type the string "I Love COE 205" on your keyboard, what byte sequence is sent to the computer using ASCII codes, with the 8<sup>th</sup> bit being an even parity bit?