

COE 205, Term 992

Computer Organization & Assembly Programming

HW# 1

Due date: Monday, Jan. 31

- Q.1.** What is the ISA (instruction set architecture) of a computer?
- Q.2.** Briefly describe the main functionality of the program counter register (PC), the instruction register (IR), and the fetch-execute process in a computer.
- Q.3.** Describe two advantages for programming in assembly and two advantages for programming in a high-level language.
- Q.4.** Represent the following numbers in binary, octal, and hexadecimal. Use as many bits as needed, and approximate the fraction upto 5 digits:
- (i) 111.83
 - (ii) 5555.3125
- Q.5.** Express the following numbers in both sign-magnitude and 2's complement notations, assuming 16-bit representation:
- (i) -4321
 - (ii) -32767
- Q.6.** Perform the following operations twice, once for a sign-magnitude notation and once for 2's complement notation. Indicate in your answer when an overflow occurs:
- (i) $011111 + 111111$
 - (ii) $110101 - 000111$
 - (iii) $110111 + 110010$
- Q.7.** A microcontroller uses 12-bit registers. Give the following in both binary and decimal:
- (i) The maximum unsigned number that can be stored.
 - (ii) The smallest (negative) number and the largest (positive) number that can be stored using the sign-magnitude notation.
 - (iii) The smallest (negative) number and the largest (positive) number that can be stored using the 2's complement notation.
- Q.8.** If you type the phrase HW#1 on your keyboard, what is the binary sequence sent to the computer using 8-bit ASCII with the 8th bit being an even parity bit.