Name: KEY   **Id#**

COE 202, Term 122
Digital Logic Design

Quiz# 1

Date: Monday, Feb. 11

Q1. Assume that a signal has a range of 0 to 8 volts. Suppose that we need to quantize the signal into a digital signal using only 5 different values. Determine these values and the maximum quantization error.

Step = 8/5=1.6, Maximum quantization error = step/2 = 8/10=0.8.
Thus, values = {0.8, 2.4, 4, 5.6, 7.2}.

Q2. Determine the decimal value of the following numbers:

    i. $(10100100.011)_2$

        $= 128+32+4+1/4+1/8= 164.375$

    ii. $(5F.82)_{16}$

        $= 5*16+15+8/16+8/256 = 95.5078$

Q3. Represent the following numbers in **binary** and **hexadecimal**. Use as many bits as needed, and approximate the fraction to **4 <u>binary</u> digits**:

    i. $(500.8)_{10}$

        $= (111110100.1100)_2$

        $= (1F4.C)_{16}$

ii. $(251.71)_8$

$= (010\ 101\ 001.111\ 001)_2$

$= (A9.E4)_{16}$

Q4. Perform the following arithmetic operations:

i. $(10011011)_2 + (01011111)_2$

$= (11111010)_2$

ii. $(F0)_{16} - (B2)_{16}$

$= (3E)_{16}$

Q5. Fill in the Spaces: (Show all work needed to obtain your answer)

a. In binary system, the largest value that can be expressed using **n** integral digits and **m** fractional digits is $\underline{2^n - 2^{-m}}$.

b. Counting the number of hours in one week in BCD requires a minimum of $\underline{12}$ (how many) bits.

c. Given that an 8-bit register stores the ASCII code of a character in the least significant 7 bits and a parity bit in the most significant bit. Assuming that the register contains the hexadecimal value E4 representing a character, the character stored in the register is 'd' and the parity used is even (i.e. even or odd parity). Note that the ASCII code of character 'A' is 41h and the ASCII code of character 'a' is 61h.