Name: KEY **Id#**

COE 202, Term 131
Digital Logic Design

Quiz# 1

Date: Thursday, Sep. 19

Q1. Assume that an analogue signal has a range of **0 to 10 volts**. Suppose that we need to quantize the analogue signal into a digital signal using only **5** different values. Determine these values and the maximum quantization error. How many bits are needed to transmit one of these 5 values?

Step = 10/5 = 2 Maximum quantization error = step/2=1
Values: 1, 3, 5, 9
Since we have 5 values, it is sufficient to have 3 bits to encode them.

Q2. Determine the **decimal** value of the following numbers:

i. $(11111100.101)_2$

= 252.625

ii. $(2A.4)_{16}$

= 42.25

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

i. $(160.1875)_{10}$

$=(10100000.0011)_2 = (A0.3)_{16}$

ii. $(57.33)_8$

$=(101\ 111.011011)_2 = (2F.6C)_{16}$

Q4. Perform the following arithmetic operations:

i. $\mathbf{(01101111)_2 + (00111111)_2}$

$= (1010\ 1110)_2$

ii. $\mathbf{(A0)_{16} - (99)_{16}}$

$=(07)_{16}$

iii. $\mathbf{(5A)_{16} * (12)_{16}}$

$=(654)_{16}$

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

a. In **binary** system, the largest decimal value that can be expressed using **4** integral digits and **2** fractional digits is $=(1111.11)_2=(15.75)_{10}$.

b. Representing the number **95** in **BCD** requires a minimum of _____8_____(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 **C6** representing a character, the character stored in the register is ___F___ 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.