ECEN 202 **Assignment 0**

Number Systems

1. Are the following analog or digital quantities ? :
   (a) The volume of water in your bath.
   (b) The grains of sand on the beach
   (c) The light level in the room
   (d) The time display on your microwave's clock

2. Convert the following decimal numbers into 8-bit binary:
   (a) 17
   (b) 178
   (c) 201

3. Convert the binary numbers into decimal:
   (a) 101101
   (b) 00101
   (c) 111011

4. How many binary bits would be needed to present the following decimal numbers?
   (a) 57
   (b) 128

5. What is the maximum decimal number that can be represented by:

   (a) 4 bits

   (b) 8 bits

   (c) 16 bits

6. Covert into binary and calculate:

   (a) 44 + 5

   (b) 65 + 56

   (c) 23 x 7

7. Convert the following decimal numbers into hexadecimal:

   (a) 125

   (b) 2567

8. Convert the following hexadecimal into decimal:

   (a) $57A4B_H$

   (b) $D1_H$

9. (a) Convert 0110100000111001 (BCD) into its decimal equivalent.

   (b) Convert 13710 into both binary and BCD.

10. Encode your course code “ECEN202” into ASCII code using the hex representation.

11. A rotary encoder wheel is used to measure the rotation of a motor shaft by using an 8-bit Gray code.

    (i) What is the angular resolution with which the position of the shaft can be measured?

    (ii) In a certain position of the wheel, the code 01101101 is put out by the encoder. Convert this Gray code to conventional binary.

(iii) If we assume that 00000000 is the reference position of the wheel, calculate the angular position when the output code in (ii) is received.
(iv) What is the uncertainty in your angular position calculated above ?
(v) The binary code in (ii) must now be converted to binary coded decimal in order to drive a display. What is this corresponding BCD code ?

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