National University of Computer & Emerging Sciences, Karachi
Spring -2022 CS-Department
Assignment 1

Course Code: EE-1005	**Course Name: Digital Logic Design**
Instructor Name: Sumaiyah Zahid	
Student Roll No:	**Section:**

Instructions:

- ***In case of any plague you will be given straight 0.***

Total Marks: 100

Binary Numbers **Marks: 10**

1. Convert the following binary numbers into decimal:
   (a) 100001 (b) 100111 (c) 101010 (d) 111001 (e) 1011100.10101 (f) 1110001.0001 (g) 1011010.1010 (h) 1111111.11111
1. What is the highest decimal number that can be represented by each of the following numbers of binary digits (bits)?
   (a) two (b) three (c) four (d) five (e) six (f) seven (g) eight (h) nine (i) ten (j) eleven
2. How many bits are required to represent the following decimal numbers?
   (a) 5 (b) 10 (c) 15 (d) 20 (e) 100 (f) 120 (g) 140 (h) 160
3. Generate the binary sequence for each decimal sequence:
   (a) 32 through 63 (b) 64 through 75

Decimal To Binary **Marks: 10**

1. Express these decimal numbers as the sum of the values of each digit.
   (a) 263.098 (b) 5436.78 (c) 234543.8901
2. Convert each decimal number to binary by using the sum-of-weights method:
   (a) 65.26 (b) 97.762 (c) 127.09 (d) 198.0175
3. Convert each decimal number to binary using repeated division/multiplication method:
   (a) 35.76 (b) 40.456 (c) 49.8732 (d) 60.35

Binary Arithmetic **Marks: 10**

1. Perform the following operations:
   (a) 111 + 101 (b) 1111 + 111 (c) 1111 + 1111
   (d) 1111 - 11 (e) 1101 - 101 (f) 110000 - 1111
   (g) 1100 * 101 (h) 1110 * 1110 (i) 1111 * 1100
   (j) 110 /11 (k) 1010 /10 (l) 1111 / 101

Signed Numbers **Marks: 10**

1. Determine the 1's complement of each binary number:
   (a) 10111011 (b) 1001010 (c) 10101010
2. Determine the 2's complement of each binary number using either method:
   (a) 11001100 (b) 11000111
3. Express each decimal number in binary as an 8-bit sign-magnitude number:
   (a) +100 (b) -98
4. Express each decimal number as an 8-bit number in the 1's complement form:
   (a) -29 (d) +115
5. Express each decimal number as an 8-bit number in the 2's complement form:
   (a) +12 (b) -68 (c) +101
6. Determine the decimal value of each signed binary number in the sign-magnitude form:
   (a) 10011001 (b) 01110100 (c) 10111111

7. Determine the decimal value of each signed binary number in the 1's complement form:
   (a) 10011001 (b) 01110100 (c) 10111111
8. Determine the decimal value of each signed binary number in the 2's complement form:
   (a) 10011001 (b) 01110100 (c) 10111111

Arithmetic Operations with Signed Numbers **Marks: 20**

1. Convert each pair of decimal numbers to binary and add using the 2's complement form:
   (a) 33 and 15 (b) 56 and -27 (c) -46 and 25 (d) -110 and -84
2. Perform the following operations:
   (a) 00010110 + 00110011 (b) 01110000 + 10101111
   (c) 10001100 + 00111001 (d) 11011001 + 11100111
   (e) 00110011 - 00010000 (f) 01100101 – 11101000
   (g) 01101010 * 11110001 (h) 10001000 / 00100010
   (i) 10001100 * 10111001 (j) 11011001 / 11100111

HexaDecimal Numbers **Marks: 20**

1. Convert each hexadecimal number to decimal:
   (a) 42 (b) 64 (c) 2B (d) 4D (e) FF16 (f) BC (g) 6F1 (h) ABC
2. Convert each decimal number to hexadecimal:
   (a) 365 (b) 3652 (c) 7825 (d) 8925
3. Perform the following operations on hexadecimal number:
   (a) 25 + 33 (b) 43 + 62 (c) A4 + F5 (d) FC + AE
   (e) 60 - 39 (f) A5 - 98 (g) F11 - A6 (h) AC- 10
4. Generate the hexadecimal sequence:
   a. 89 through CF (b) 121 through 2FF

Octal Numbers **Marks: 10**

1. Convert each octal number to decimal:
   (a) 635 (b) 254 (c) 2673
2. Convert each decimal number to octal by repeated division by 8:
   (a) 124 (b) 156 (c) 654 (d) 9999

BCD & Gray Codes **Marks: 10**

1. Convert each of the BCD numbers to decimal:
   (a) 10000000 (b) 001000110111 (c) 100101111000 (d) 0001011010000011
2. Convert each pair of decimal numbers to BCD, and add as indicated:
   (a) 28 + 23 (b) 65 + 58 (c) 113 + 101 (d) 295 + 157
3. Add the following BCD numbers:
   (a) 00011000 + 00010001 (b) 01100100 + 00110011 (c) 01000000 + 01000111
   (d) 01010001 + 01011000 (e) 10011000 + 10010111 (f) 010101100001 + 011100001000
4. Convert each binary number to Gray code:
   (a) 11011 (b) 1001010 (c) 1111011101110
5. Convert each Gray code to binary:
   (a) 1010 (b) 00010 (c) 11000010001