Application of Information and Communication Technologies

BS DS/IT Fall 2023

Assignment # 2

Submission Deadline: **Tuesday, 24th October, 2023 (During Lecture)**

1. Add the following: $(364)_8$ and $(646)_8$ in octal system without converting to decimal.
2. Multiply $(650)_8$ and $(210)_8$ without converting to decimal.
3. Determine the base of the number assuming the operation is correct 54 / 4 = 13
4. Represent decimal 215 in (a) binary; (b) octal; (c) hexadecimal; (d) binary-coded decimal (BCD).
5. Perform subtraction using 2's complement and then using 1's complement. 110100 – 10101
6. Represent -25 stored in a 8 bit register, using sign magnitude, 2's complement and 1's complement.
7. What is the largest binary number that can be expressed with 12 bits? What is the equivalent decimal and hexadecimal?
8. Perform following arithmetic using 10's complement
    a. (-9826) + (+801)
    b. (+9826) + (-801)
9. Convert decimal 9126 to both BCD and ASCII codes.
10. Assign a binary code in some orderly manner to the 52 playing cards. Use the minimum number of bits.
11. Write the expression "Abdullah" In ASCII using an eight-bit code.
12. What bit must be complemented to change an ASCII letter from capital to lowercase, and vice versa?
13. Floating point numbers are represented in computer systems as 32 bit binary numbers as discussed in class. Convert the following Floating Point Decimal numbers. Give your final answer in Hex-Decimal Notation. Show complete working
    a. 13.4
    b. -14.7
    c. 31.9
14. Given the following Boolean functions; (perform given operations with each function separately using not, and, or, xor, nand, nor, & xnor gates as discussed in class).
    a. F(x, y) = [(x + y)(x + y')]'
    b. F(A, B, C) = [A'C' + ABC + AC']'
    c. F(w, x, y, z) = (x'y' + z)' + z + xy + wz
    d. F(x, y, z) = (xy + z) **xor** (y + xz)
    e. F(A, B, C, D) = (AB + C) **xnor** (B + C'D)

    - Obtain the truth table of each function
    - Draw the logic diagram using symbolic gates as discussed in class
    - Dry run the circuit by applying sample values from the truth table

Note: This assignment should be handwritten on A4 pages, with a printed cover page stating students' names and Roll Numbers, etc.