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B.Tech.(CS-A and B), III Semester, Assignment-I, 2023

1. Do the following (Arithmetic operations):

(a) The signed decimal number +75 equal to ——— in 8 bit 2's complement.
(b) The 2's complement number 10000000 is equal to—— in signed decimal.
(c) The number 01110000 is equal to——— in signed decimal.
(d) Subtract $(10000)_2$ from $(11010)_2$ using 1's complement.
(e) Subtract $(1010100)_2$ from $(1010100)_2$ using 2's complement.

2. Do following arithmetic operations using 7-bit 2's complement method:
(a) (+23)+(+46) (b) (+23)+(-46) (c) (-23)+(-46) (d) (-23)+(+46)

3. Design the XOR Gate using a) only NAND gate b) Only NOR gate.

4. Simplify the following Boolean expression to a minimum number of literals.
a) F1=(BC'+A'D) (AB'+CD') b) F2= xy+x(wz + wz')

5. Express the complement of the following functions in the sum of min-terms:
$a) F(A,B,C,D) = \sum(0,2,6,11,13,14)$ $b) F(x,y,z) = \prod(0,1,2,3,4,6)$

6. Determine the Canonical SOP, POS, minimal SOP, and POS expression for the following truth table. Also draw the logic diagram for each of them.

A (Input)	0	0	0	0	1	1	1	1
B (Input)	0	0	1	1	0	0	1	1
C (Input)	0	1	0	1	0	1	0	1
Y (Output)	0	1	0	1	0	1	0	0

7. Find the minimal SOP and POS expression of the following using K-map.
a) $F = \sum m(1,5,6,12,13,14) + \sum d(2,4)$
b) $F = \sum m(1,3,5,7,9,15) + \sum d(4,6,12,13)$
c) $F(A,B,C) = \sum m(1,2,5,7) + \sum d(0,4,6)$
d) $F(A,B,C) = \prod(0,3,6,7)$

8. Design a Full adder using 3x8 Decoder.

9. Implement 16x1 MUX using 8x1 and 2x1 MUX.

10. Draw a NAND logic diagram that implements the complement of the following function:
$F(A,B,C,D) = \sum(0,1,2,3,4,8,9,12)$

11. Implement the following Boolean function using
a) 16:1 MUX b) 8:1 MUX c) 4:1 MUX d) 2:1 MUX
$F(A,B,C,D) = \sum m(0,1,3,4,8,9,15)$