

EE1005 – Digital Logic Design

Assignment 2

Spring 2023

Maximum Marks: 100

Due Date: 23 February 2023

Instructions:

- Partially or fully **copied assignments** will be marked as **zero**.
- Only **handwritten** solution on **A4 page** will be accepted.
- Late submissions are not allowed.
- Clearly indicate all the calculations in your solution. No points will be awarded in case of missing calculations.
- You can submit your assignment **before 5:00 PM** on/before due date.

Question Number 1

(2 x 5 = 10 marks)

Simplify the following Boolean Functions to minimum possible number of literals.

- $xyz + x'y + xyz'$
- $ABC + A'B + ABC'$
- $x'yz + xz$
- $(x + y)'(x' + y')$
- $(BC' + A'D)(AB' + CD')$

Question Number 2

(2 x 5 = 10 marks)

Reduce the following Boolean expressions to the indicated number of literals

- $A'C' + ABC + AC'$ to three literals
- $(x'y' + z)' + z + xy + wz$ to three literals
- $A'B(D' + C'D) + B(A + A'CD)$ to one literal
- $(A' + C)(A' + C')(A + B + C'D)$ to four literals
- $ABC'D + A'BD + ABCD$ to two literals

Question Number 3

(4 + 4 + 4 + 3 = 15 marks)

Find the complement of $F = wx + yz$ by using duality, then use the truth table to show that $FF' = 0$ and $F + F' = 1$.

Question Number 4

(5 + 5 = 10 marks)

Simplify the following Boolean functions T1 and T2 to a minimum number of literals.

a	b	c	T1	T2
0	0	0	1	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	1
1	0	1	0	1
1	1	0	0	1
1	1	1	0	1

Question Number 5**(8 + 4 + 4 + 4 = 20 marks)**

For the Boolean function

$$F = xy'z + x'y'z + w'xy + wx'y + wxy$$

- Obtain the truth table of F.
- Draw the logic diagram, using the original Boolean expression.
- Use Boolean algebra to simplify the function to a minimum number of literals.
- Obtain the truth table of the function from the simplified expression and show that it is the same as the one in part (i).

Question Number 6**(3 + 7 = 10 marks)**

Use the Boolean algebra to represent the following functions as sum of minterms.

- $F(x, y, z) = x' + x(x + y')$
- $F(A, B, C, D) = BC' + AB + ACD$

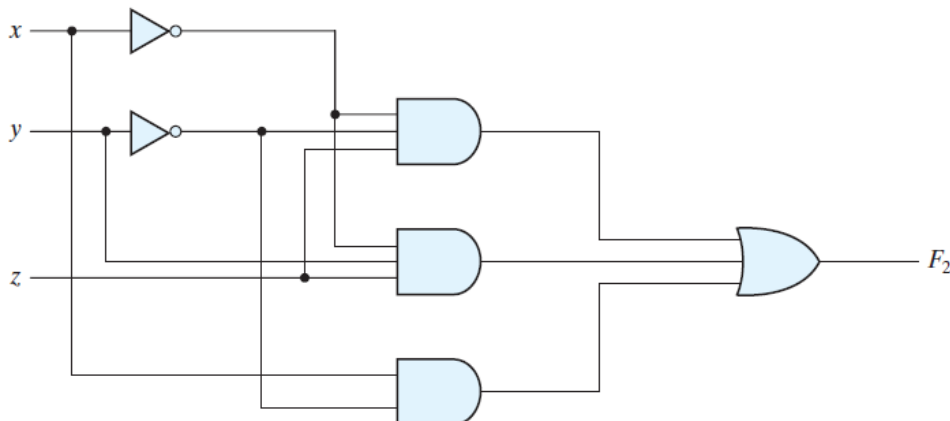
Question Number 7**(9 + 6 = 15 marks)**

Use the Boolean algebra to represent the following functions as product of maxterms.

- $F(x, y, z) = x'y'z + x'yz + xy'$
- $F(x, y, z) = xy + x'z$

Question Number 8**(4 + 6 = 10 marks)**

Write Boolean expression and construct the truth table describing the output of the circuit described by the logic diagram shown in the figure below.



😊 Good Luck 😊