

DLD Assignment 6

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1 Question

A function $F(A,B,C)$ defined by three Boolean variables A , B and C when expressed as sum of products is given by

$$F = \overline{A}.\overline{B}.\overline{C} + \overline{A}.B.\overline{C} + A.\overline{B}.\overline{C} \quad (1)$$

where, \overline{A} , \overline{B} , and \overline{C} are the components of the respective variables. The product of sums (POS) form of the function F is

- (A) $F=(A+B+C).(A+\overline{B}+C).(\overline{A}+B+C)$
- (B) $F=(\overline{A}+\overline{B}+\overline{C}).(\overline{A}+B+\overline{C}).(A+\overline{B}+\overline{C})$
- (C) $F=(A+B+\overline{C}).(A+\overline{B}+\overline{C}).(\overline{A}+B+\overline{C}).(\overline{A}+\overline{B}+C).(\overline{A}+\overline{B}+\overline{C})$
- (D) $F=(\overline{A}+\overline{B}+C).(\overline{A}+B+C).(A+\overline{B}+C).(A+B+\overline{C}).(A+B+C)$

2 Solution

2.1 Truth Table

A	B	C	F	Maxterms
0	0	0	1	-
0	0	1	0	$A+B+\overline{C}$
0	1	0	1	-
0	1	1	0	$A+\overline{B}+\overline{C}$
1	0	0	1	-
1	0	1	0	$\overline{A}+B+\overline{C}$
1	1	0	0	$\overline{A}+\overline{B}+C$
1	1	1	0	$\overline{A}+\overline{B}+\overline{C}$

Table 1: *Truth Table for eq.(1)*

From the above truth table, we get the following POS expression

$$F = (A + B + \overline{C}).(A + \overline{B} + \overline{C}).(\overline{A} + B + \overline{C}).(\overline{A} + \overline{B} + C).(\overline{A} + \overline{B} + \overline{C}) \quad (2)$$

which is the same as option (C) above.

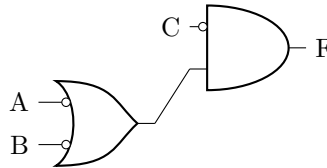
2.2 K-map

		AB			
		00	01	11	10
C	0	1	1	0	1
	1	0	0	0	0

the simplified POS expression obtained from the Karnaugh map above is

$$F = (\overline{A} + \overline{B}).\overline{C} \quad (3)$$

2.3 Circuit Diagram



making a logic diagram using only NAND gates,

