Lab Report - 03

Course No: 206

Course Title: Digital Logic Design

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Name of experiment : Implementation of Boolean function

Equipment :
(i) Two input AND Gate
(ii) Two input OR Gate
(iii) NOT Gate
(iv) Logic Gate
(v) Logic probe

Describe : The implementation of Boolean function by using Logic gates involves connecting output of one Logic gate to the input of another gates. Commonly used Logic Gates are AND, OR, NOT Gates. This Boolean function implementation is very simple and easy form.

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$F = \bar{A}\bar{B}C\bar{D} + \bar{A}BC\bar{D} + ABC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}CD$

A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

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Implementation the Boolean function

$F = \bar{A}\bar{B}C\bar{D} + \bar{A}BC\bar{D} + ABC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}CD$

$\Rightarrow \bar{A}C\bar{D}(\bar{B}+B) + ABC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}CD$ [Distributive Law]

$\Rightarrow \bar{A}C\bar{D}\cdot 1 + ABC\bar{D} + A\bar{B}\bar{D}(C+\bar{C}) + A\bar{B}D(\bar{C}+C)$ [Complement Law]

$\Rightarrow \bar{A}C\bar{D}\cdot 1 + ABC\bar{D} + A\bar{B}\bar{D}\cdot 1 + A\bar{B}D\cdot 1$ [Identity Law]

$\Rightarrow \bar{A}C\bar{D} + ABC\bar{D} + A\bar{B}\bar{D} + A\bar{B}D$

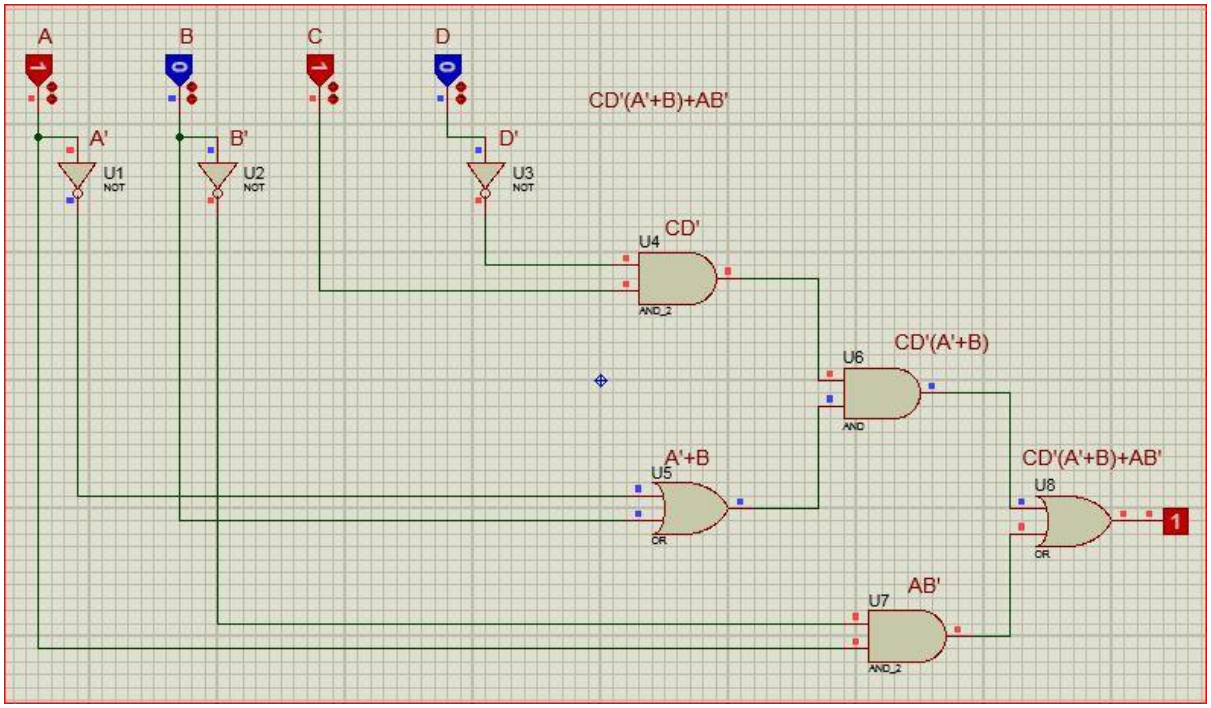
$\Rightarrow C\bar{D}(\bar{A}+AB) + A\bar{B}(\bar{D}+D)$ [Distributive Law]

$\Rightarrow C\bar{D}((\bar{A}+A)(\bar{A}+B)) + A\bar{B}\cdot 1$ [Absorption Law]

$\Rightarrow C\bar{D}(1\cdot\bar{A}+B) + A\bar{B}$

$\Rightarrow CD(\bar{A}+B) + A\bar{B}$

Ans


A
B
C
D
CD'(A'+B)+AB'
A'
B'
D'
U1
NOT
U2
NOT
U3
NOT
CD'
U4
AND_2
CD'(A'+B)
U6
AND
A'+B
U5
OR
CD'(A'+B)+AB'
U8
OR
1
AB'
U7
AND_2

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Conclusion:

① Boolean function can be implemention using the basic gates.

② Logic gates are very small circuit that implement Boolean operation.

③ Boolean function are easy to implement by truth table & Logic gates

④ we ~~worked~~ design the circuit to proteus software.