Lab Report

LAB — 03 CSE — 206

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CSE — 206

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LAB-03

Name of the experiment: Implementation of Boolean function.

Equipment:

Without Simplification:

(i) Not Gate
(ii) Logic State
(iii) Logic Probe
(iv) 4 input AND Gate (AND_4)
(v) x input OR Gate (OR_x)

With Simplification:

(i) Not Gate
(ii) Logic State
(iii) Logic Probe
(iv) 2 input AND Gate (AND)
(v) 3 input AND Gate (AND_3)
(vi) 3 input OR Gate (OR_3)

Description: Boolean functions are an important object in logic gate implementation. This function's implementation means logic gates involves connecting output of one logic gate to the input of another gates. Commonly used logic gates are AND, OR, NOT etc. These gates are easy to use and easy for explanation.

Given equation:

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

[This form is without simplification]

Simplification:

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

[Distributive Law]

$\Rightarrow \bar{A}C\bar{D} \cdot 1 + ABC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + A\bar{B}CD$

[Complement and Identity Law]

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

[Distributive Law]

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

[Absorption Law]

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

[Distributive Law]

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

[complement and Identity Law]

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

[Distributive Law]

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

[Absorption Law]

$\Rightarrow C\bar{D}B + C\bar{D}\bar{A} + A\bar{B}\bar{C} + A\bar{B}\bar{D} + A\bar{B}CD$ [Distribution]

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

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

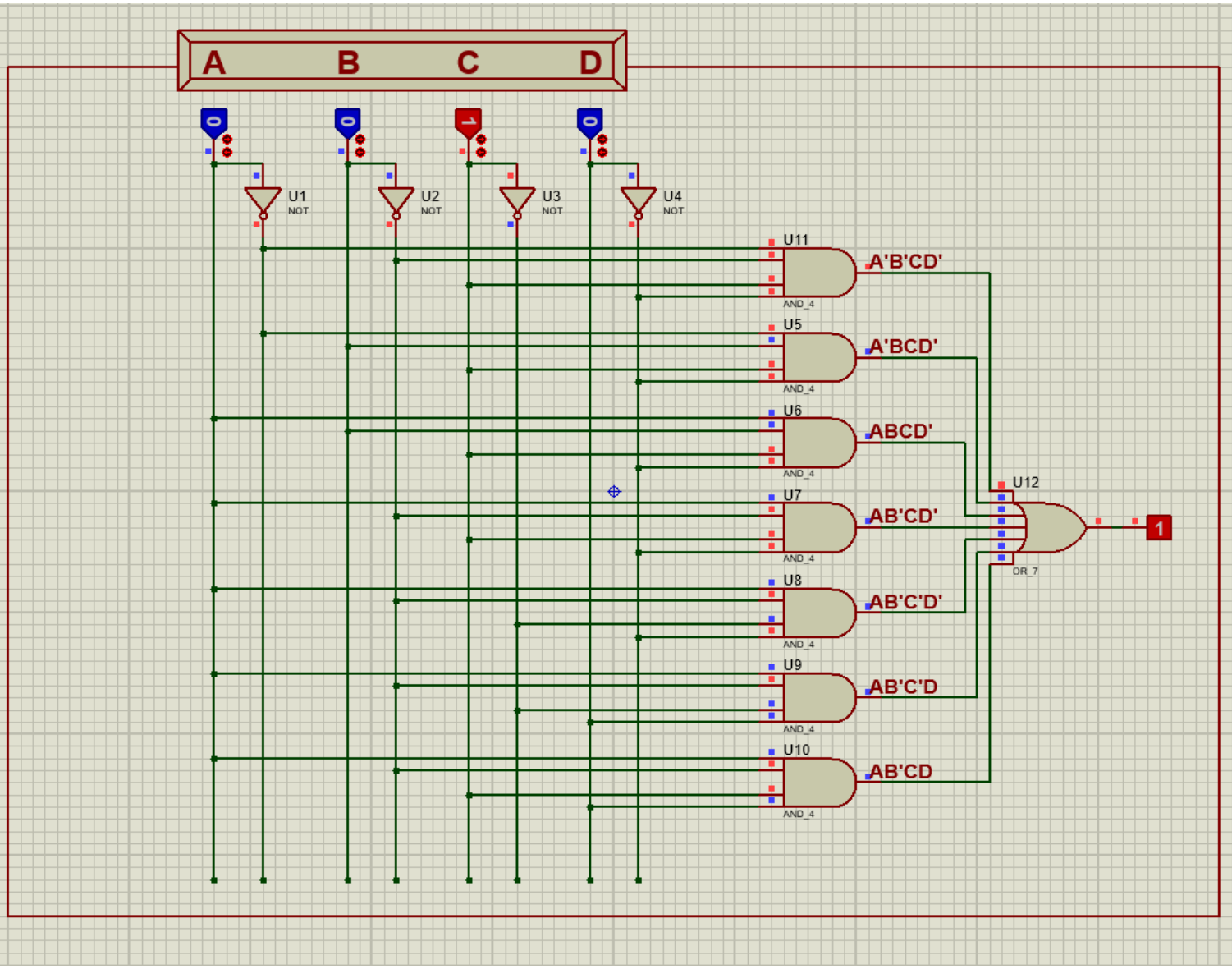
$\Rightarrow C\bar{D}B + C\bar{D}\bar{A} + A\bar{B}\bar{D} + A\bar{B}D + A\bar{B}\bar{C}$ [Distribution]

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

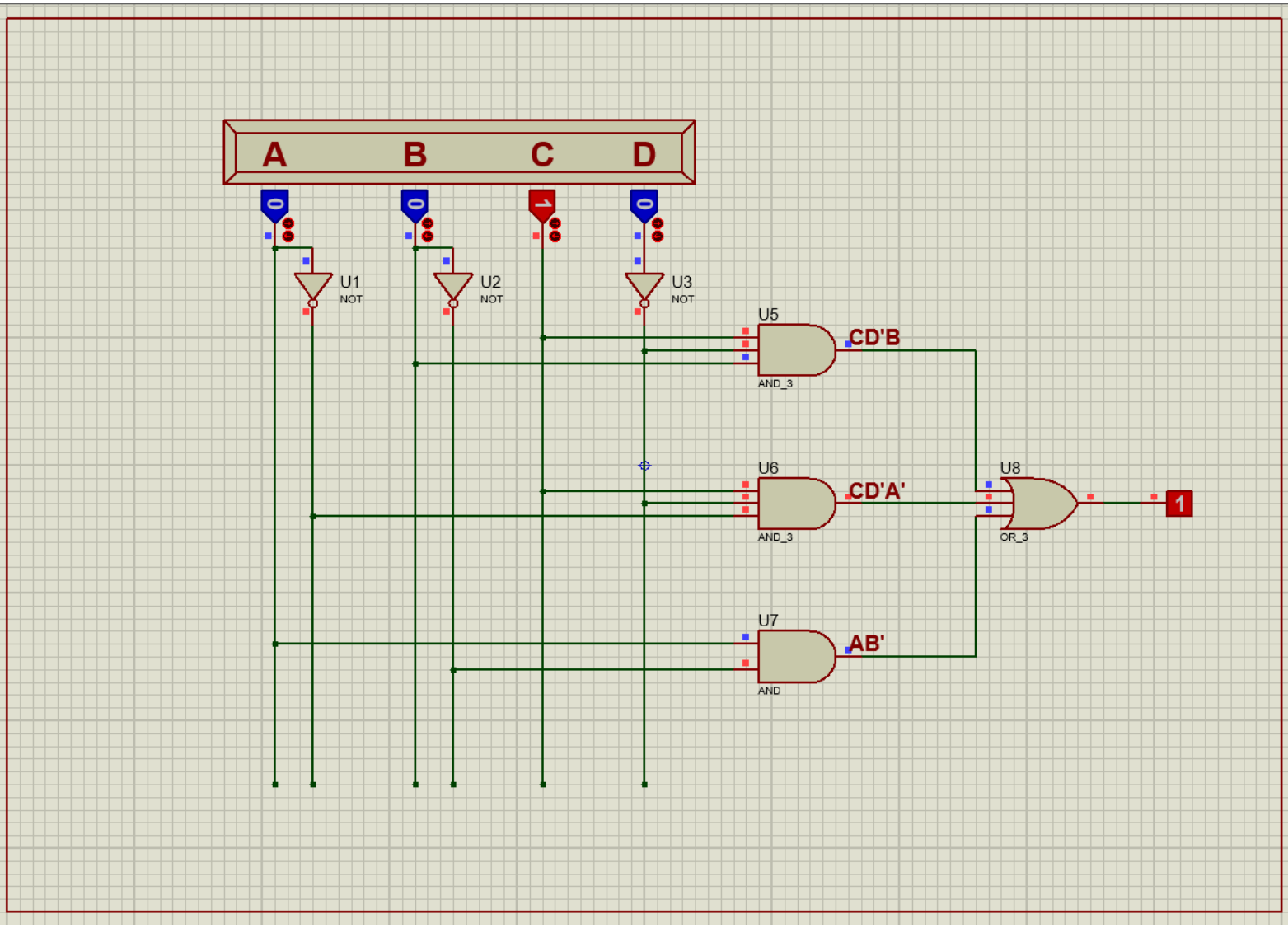
$\Rightarrow C\bar{D}B + C\bar{D}\bar{A} + A\bar{B}$ [Complement and Identity Law]

A	B	C	D	Output
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

Truth Table



Without Simplification



With Simplification

Conclution:

(i) We learnt how to implement Boolean function using the basic gates.

(ii) We learnt how to implement Boolean function using truth table.

(iii) We have also learnt how to implement circuits in Proteus software.

THE END