Exp no:2	Title: Realization of logic circuits with Boolean expressions
Date: 02-09-2021	

Aim:

To realize the logic circuits and verify the output for the following Boolean expressions

(i) $Y = (A+B)'C$

(ii) $Y = (A+B)(C+D)$

Required tools:

Multisim online circuit simulator

Theory:

Boolean algebra as the calculus of two values is fundamental to computer circuits, computer programming, and mathematical logic, and is also used in other areas of mathematics. The most common computer architectures use ordered sequences of Boolean values, called bits, of 32 or 64 values. When programming in machine code, assembly language, and certain other programming languages, programmers work with the low-level digital structure of the data registers. These registers operate on voltages, where zero volts represent Boolean 0, and a reference voltage (often +5 V, +3.3 V, +1.8 V) represents Boolean 1. Such languages support both numeric operations and logical operations. Boolean algebra reduces the circuit complexity by utilizing Boolean properties and hence a complicated expression can be realized with simple circuit. As the number of logic gates used in the circuit are reduced, the power consumption is also less which a desirable requirement in the electronics world.

Results:

Comparison of theoretical results with simulation results for $Y = (A+B)'C$

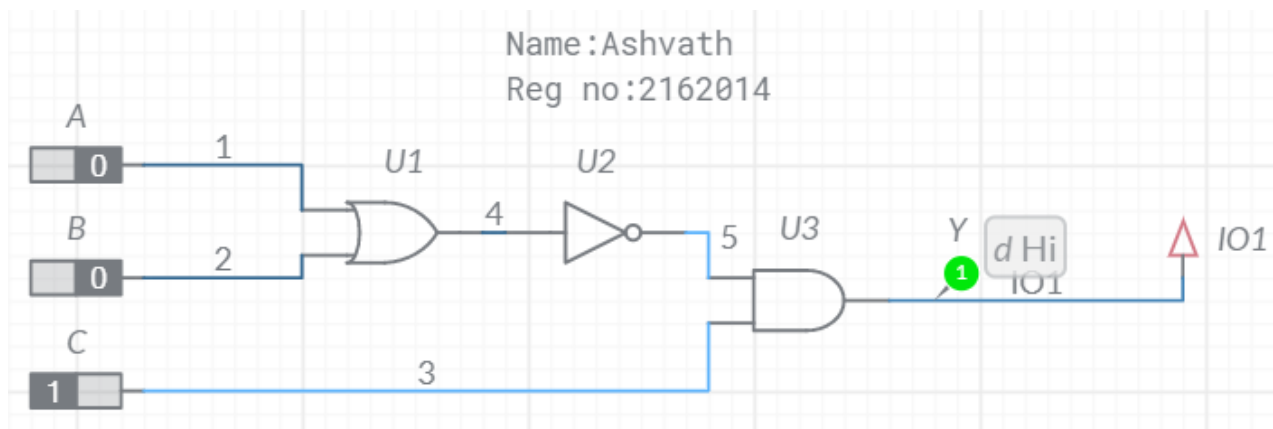| A	B	C	A+B	(A+B)'	Y = (A+B)'C	Simulation result
0	0	0	0	1	0	0
0	0	1	0	1	1	1
0	1	0	1	0	0	0
0	1	1	1	0	0	0
1	0	0	1	0	0	0
1	0	1	1	0	0	0
1	1	0	1	0	0	0
1	1	1	1	0	0	0

Figure: Logic circuit realization of (A+B)'C

Comparison of theoretical results with simulation results for Y = (A+B)(C+D)

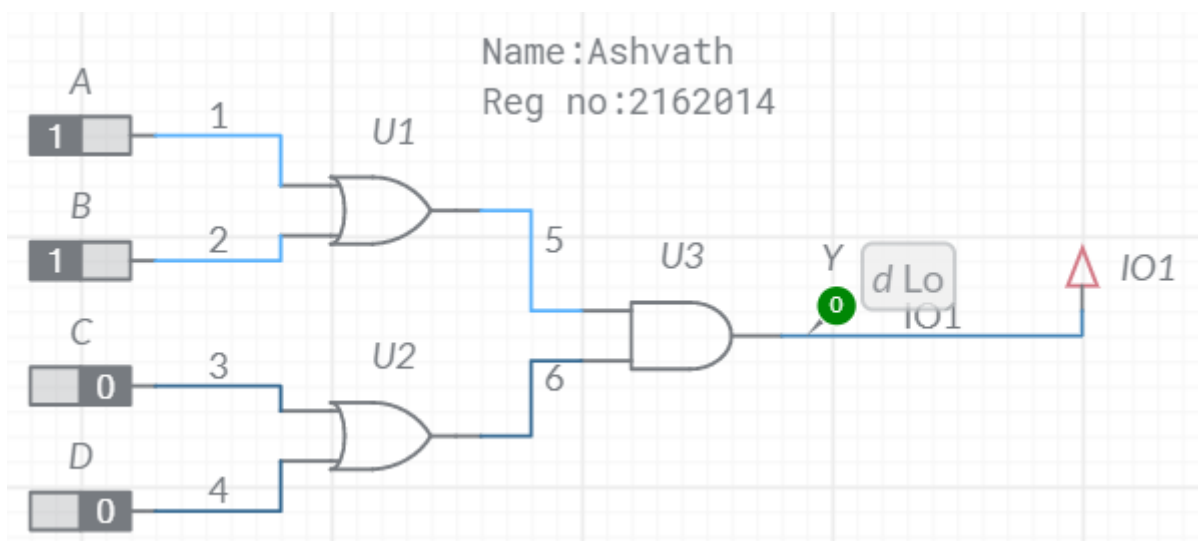| A	B	C	D	A+B	C+D	Y = (A+B)(C+D)	Simulation result
0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	0
0	0	1	1	0	1	0	0
0	1	0	0	1	0	0	0
0	1	0	1	1	1	1	1
0	1	1	0	1	1	1	1
0	1	1	1	1	1	1	1
1	0	0	0	1	0	0	0
1	0	0	1	1	1	1	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	1
1	1	0	0	1	0	0	0
1	1	0	1	1	1	1	1
1	1	1	0	1	1	1	1
1	1	1	1	1	1	1	1

Figure: Logic circuit realization of (A+B)(C+D)

Inference:

The truth tables of two Boolean expressions are verified through multisim online simulator successfully.

Student signature:	Marks:
	Faculty signature: