

DIGITAL LOGIC AND DESIGN(LAB)

DA 1

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Questions:

1A) Simplify $((A+B)'.(B+C)'.(A+C)')'$

$$((A+B)'.(B+C)'.(A+C)')'$$

$$\Rightarrow (A+B)''+(B+C)''+(A+C)''$$

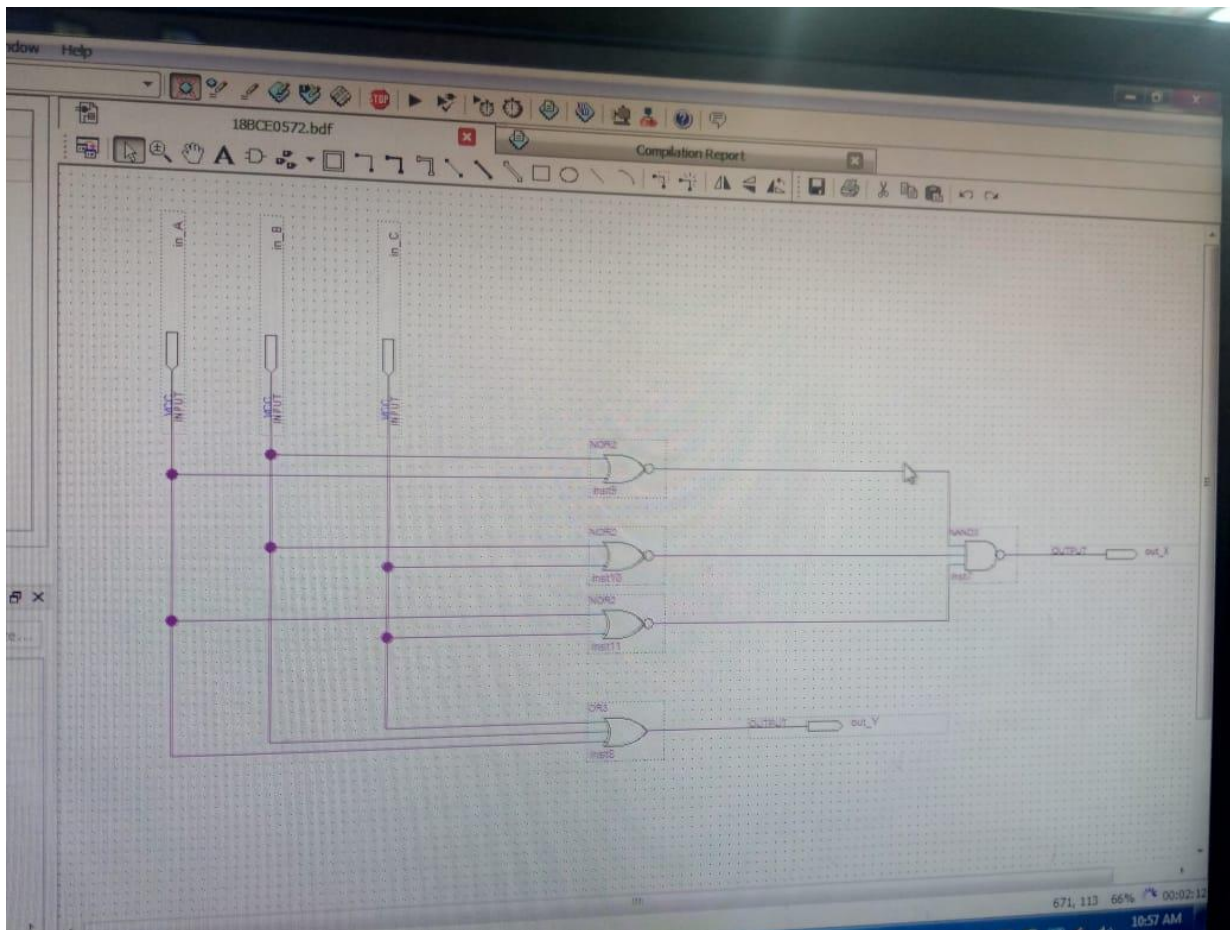
$$\Rightarrow A+B+B+C+A+C$$

$$\Rightarrow A+B+C \quad [\text{SIMPLIFIED FORM}]$$

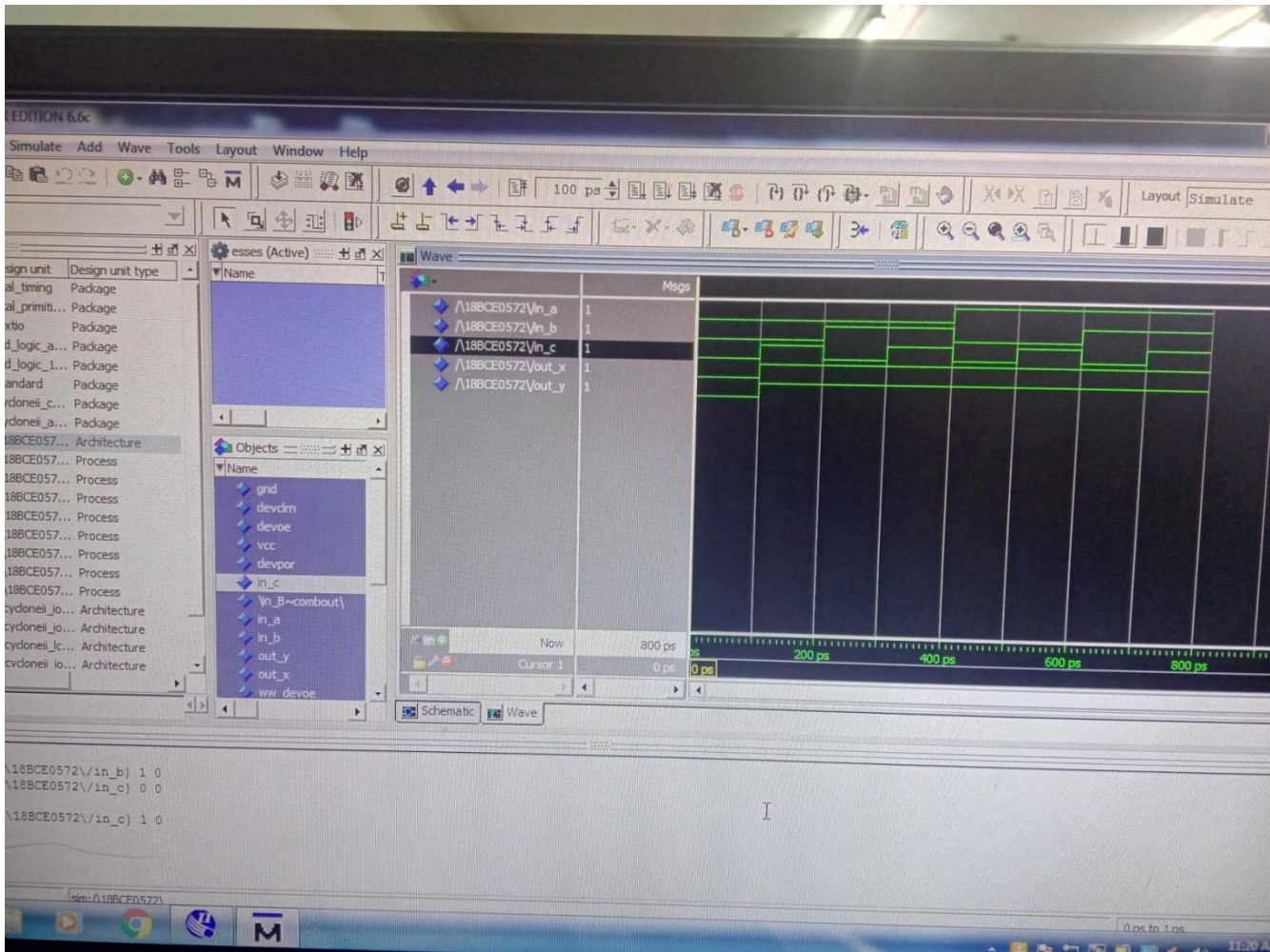
TRUTH TABLE:

A	B	C	$X=((A+B)'(B+C)'(A+C)')'$	$Y= A+B+C$
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	1
1	0	0	1	1
1	0	1	1	1
1	1	0	1	1
1	1	1	1	1

LOGIC CIRCUIT:



OUTPUT:



ANSWER:- Since the outputs for every input combination is the same for both X and Y which is also evident from the output screen, $((A+B)'.(B+C)'.(A+C)')'$ can be simplified as $A+B+C$

1B) Simplify $(A+A'B).(B+B'C).(C+C'D)$

$$(A+A'B).(B+B'C).(C+C'D)$$

$$\Rightarrow (A+A').(A+B).(B+B').(B+C).(C+C').(C+D)$$

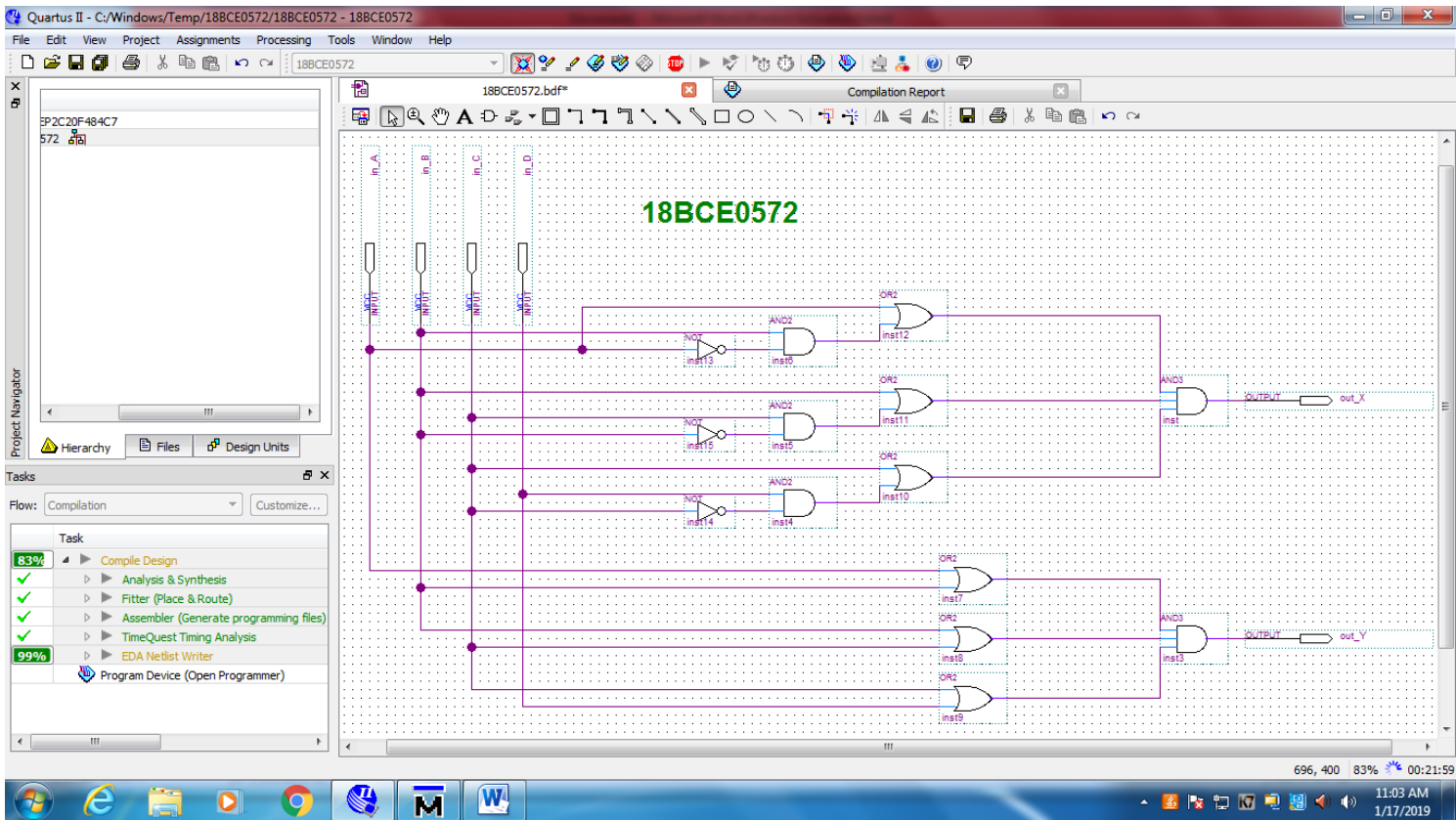
$$\Rightarrow (A+B).(B+C).(C+D) \quad [\text{SIMPLIFIED FORM}]$$

TRUTH TABLE:

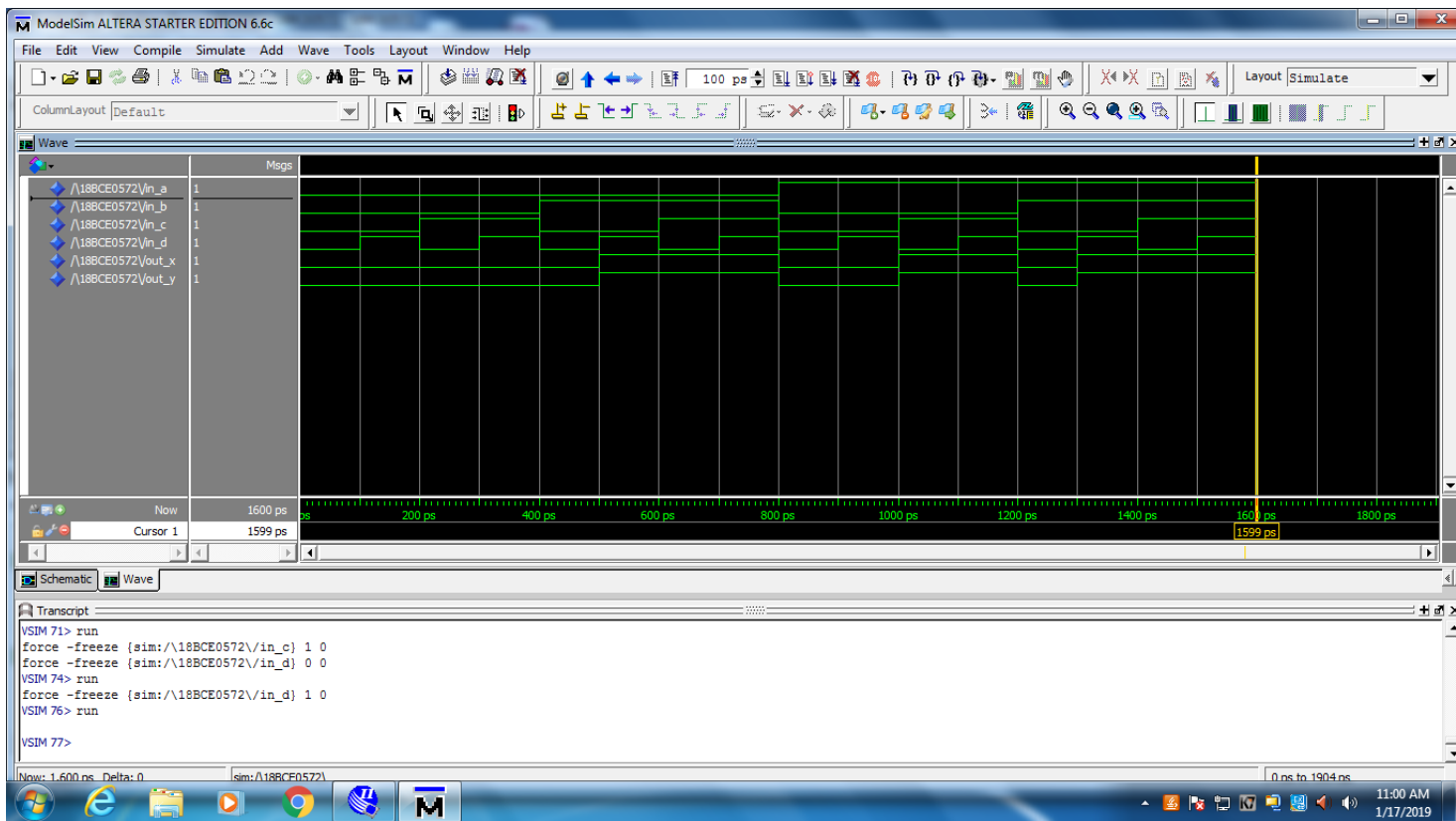
A	B	C	D	$X=(A+A'B).(B+B'C).(C+C'D)$	$Y=(A+B).(B+C).(C+D)$
0	0	0	0	0	0
0	0	0	1	0	0
0	0	1	0	0	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	0	1	1	1

0	1	1	0	1	1
0	1	1	1	1	1
1	0	0	0	0	0
1	0	0	1	0	0
1	0	1	0	1	1
1	0	1	1	1	1
1	1	0	0	0	0
1	1	0	1	1	1
1	1	1	0	1	1
1	1	1	1	1	1

LOGIC CIRCUIT:



OUTPUT:



ANSWER:- Since the outputs for every input combination is the same for both X and Y which is also evident from the output screen, $(A+A'B).(B+B'C).(C+C'D)$ can be simplified as $(A+B).(B+C).(C+D)$.

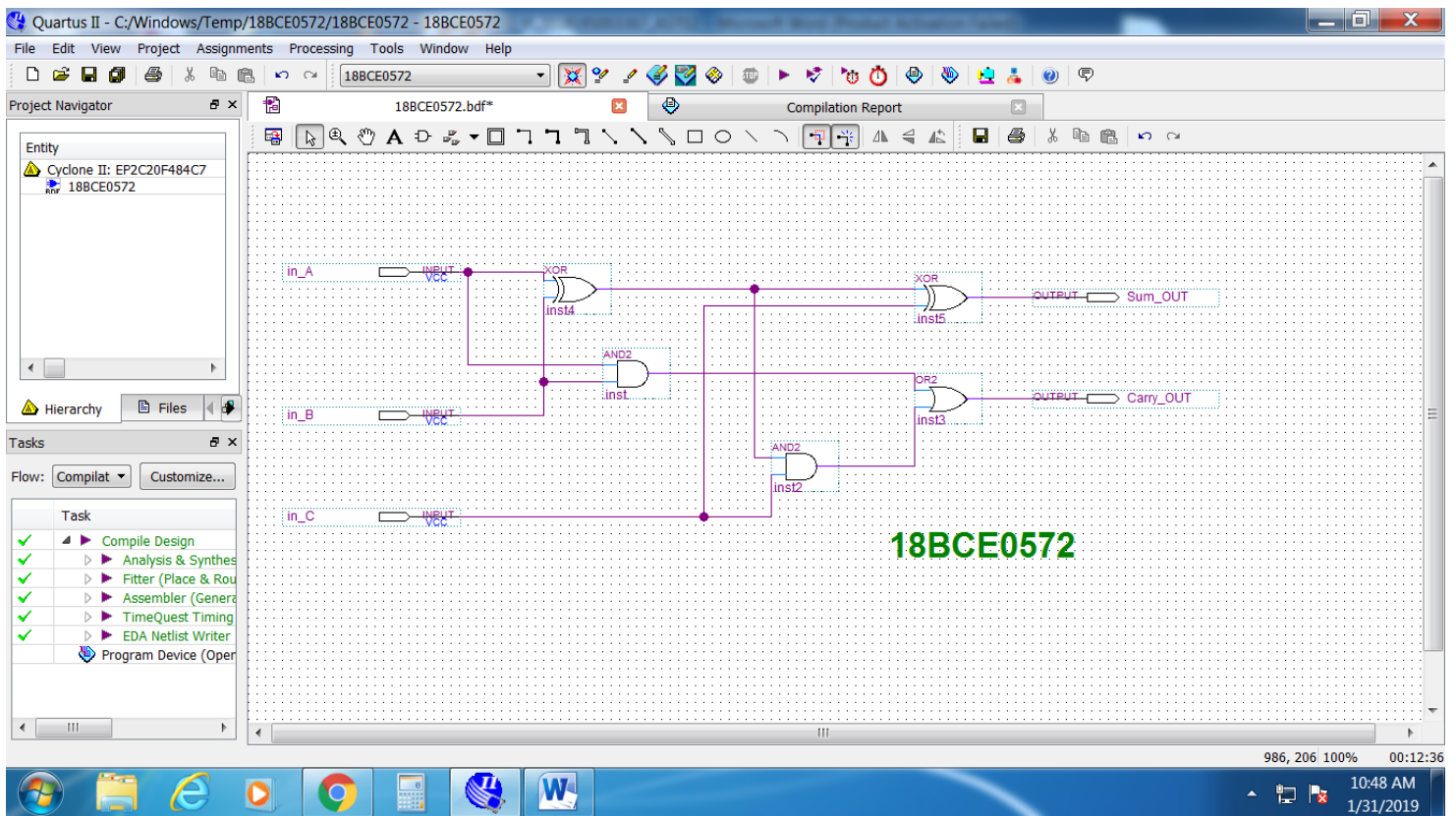
1C) Verify the full adder circuit

SUM: $A \oplus B \oplus C$ CARRY: $C.(A \oplus B) + A.B$

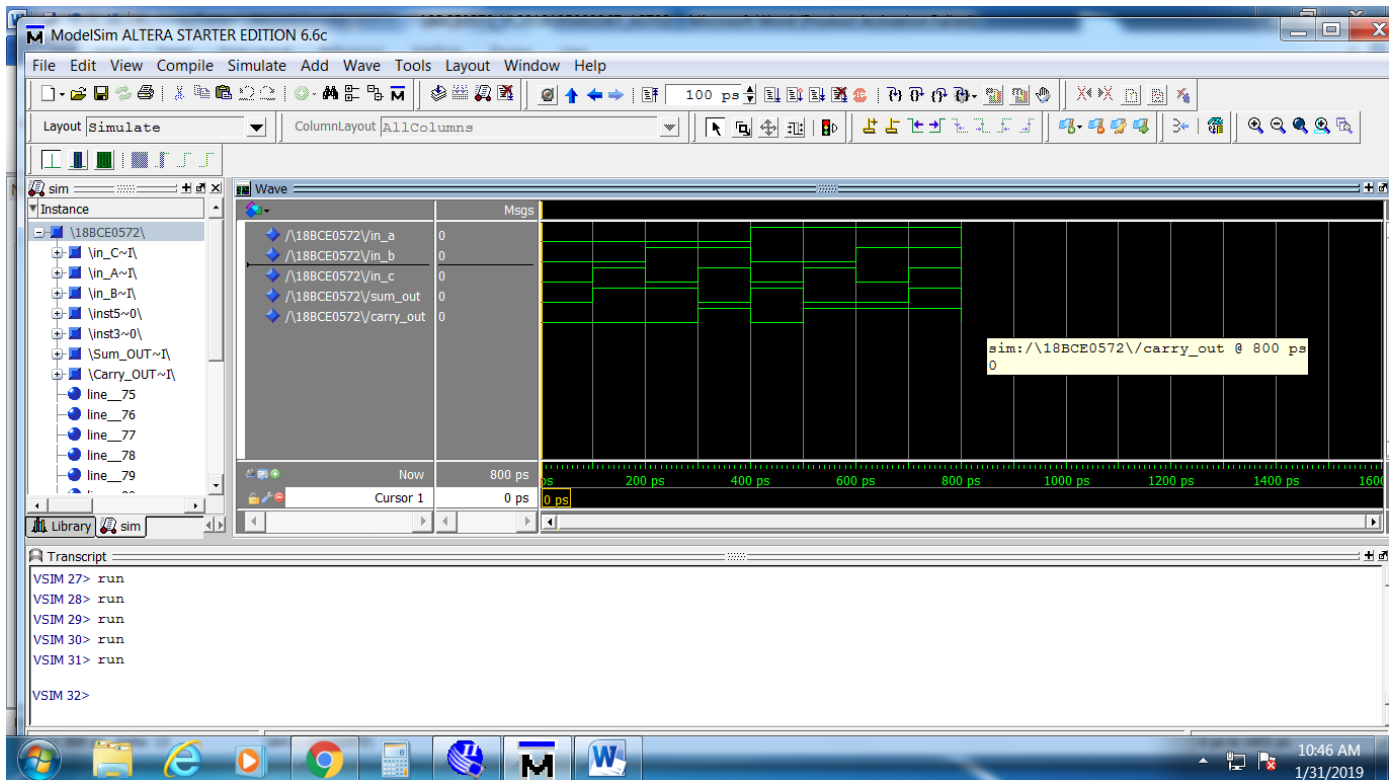
TRUTH TABLE:

A	B	C	SUM: $A \oplus B \oplus C$	CARRY: $C.(A \oplus B) + A.B$
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

LOGIC CIRCUIT:



OUTPUT:



ANSWER:- Since the outputs for every input combination is the same as normal addition also shown in the output screen, the circuit for full adder is correct and has been verified.