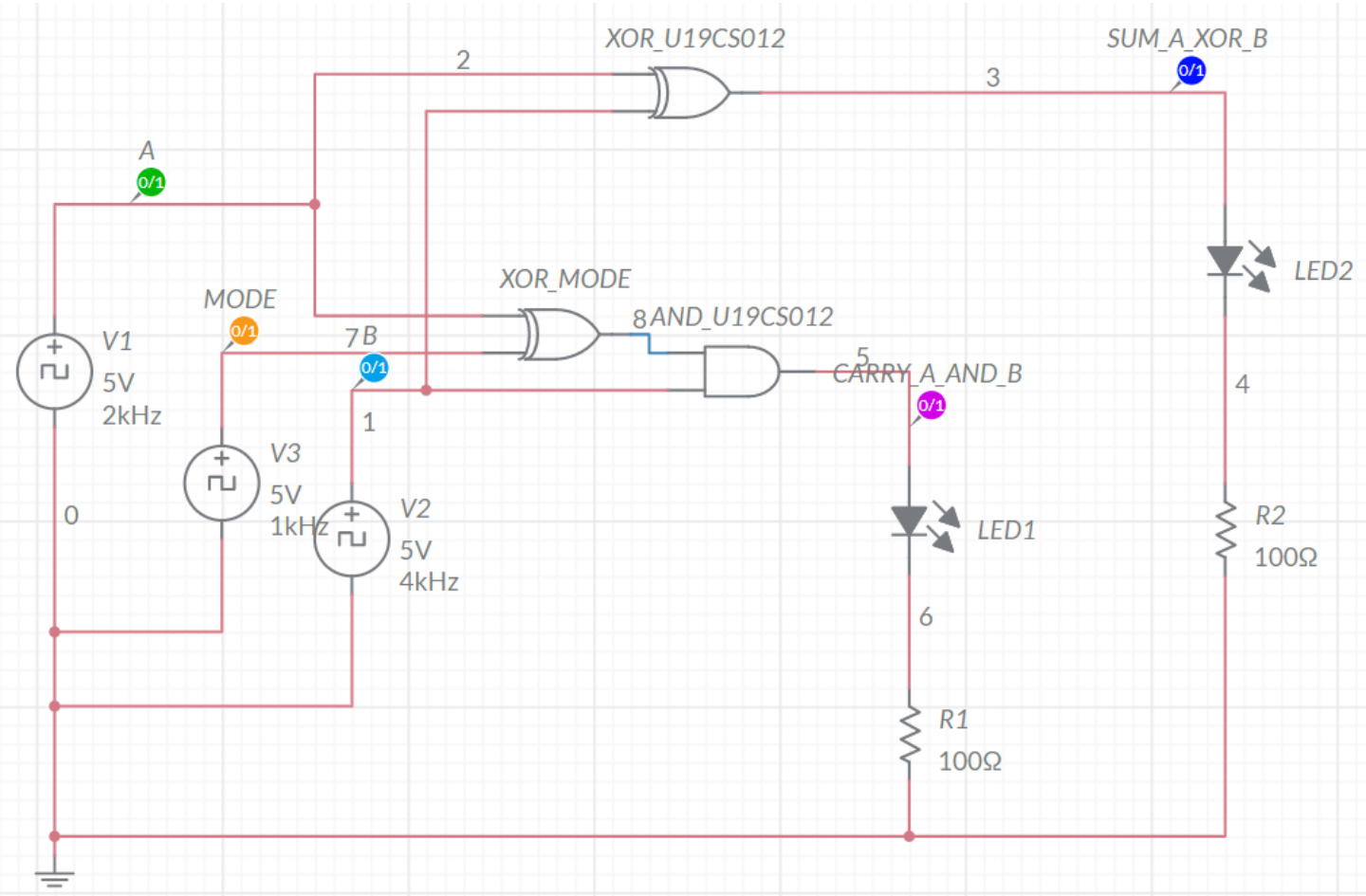
ASSIGNMENT-3

U19CS012

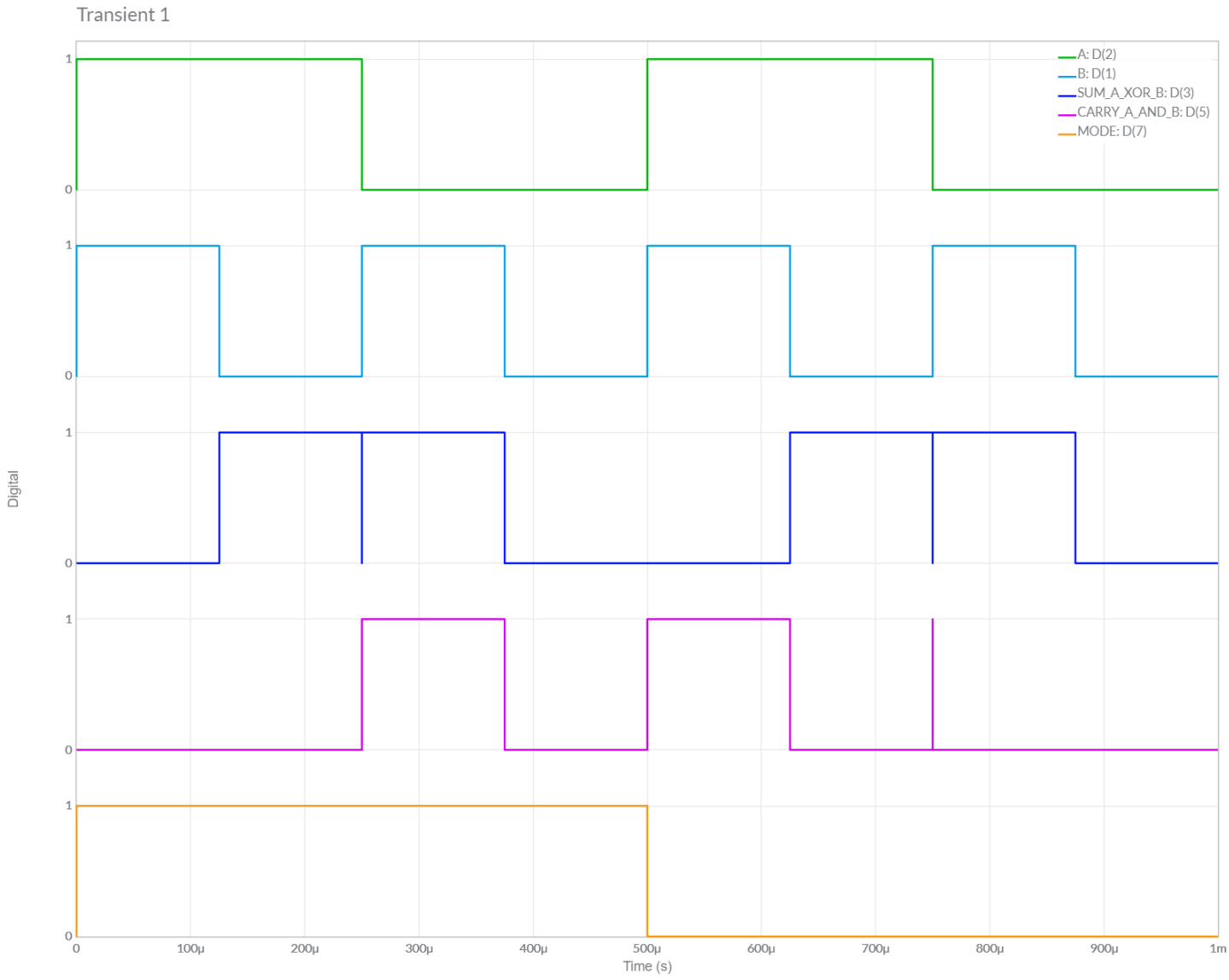
Design and verify their functionality of below circuits with the help of Multisim.

1. Design and implement Half Adder and Half Subtractor (Single Circuit) using Mode Control 'M'.

a.) Implement the circuit in Multisim online



b.) Timing Graph



c.) Truth Table:

When Mode = 1, Circuit Behaves as Half Subtractor Circuit

Borrow Out, Bout= $A' \cdot B$
Difference, D = $A \oplus B$

A	B	B_{out}	D
0	0	0	0
0	1	1	1
1	0	0	1
1	1	0	0

When Mode = 0, Circuit Behaves as Half Adder Circuit
Sum, $S = A \oplus B$
Carry, $C = A \cdot B$

A	B	C	S
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

The Same Truth Table is Followed for Next 2 Questions as well.

Conclusion:

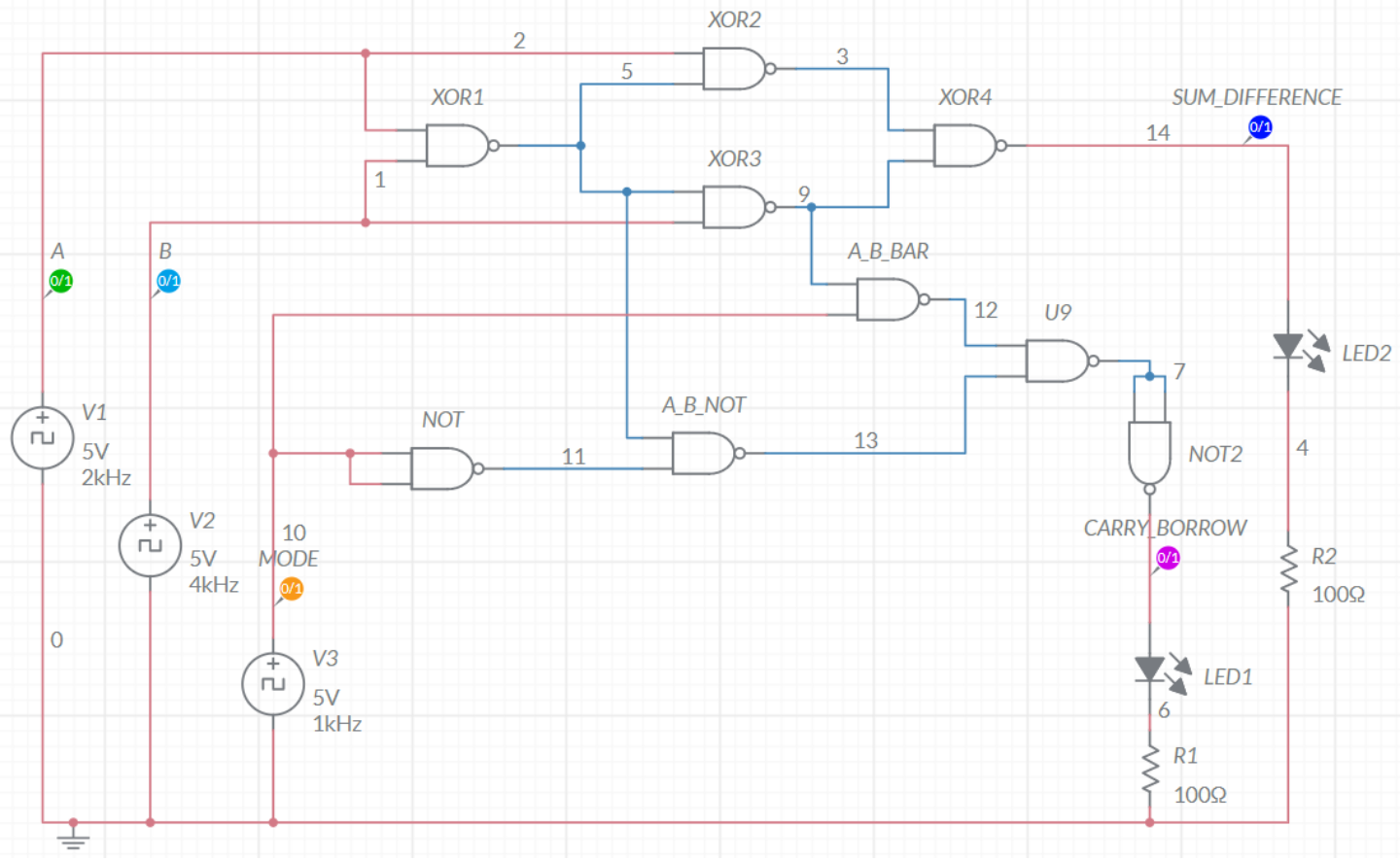
We can observe from Above Table, Both the *Theoretical* and *Multisim* Values of Given Circuit are **Equal**.

Hence, Experiment is Performed Successfully (without any Error).

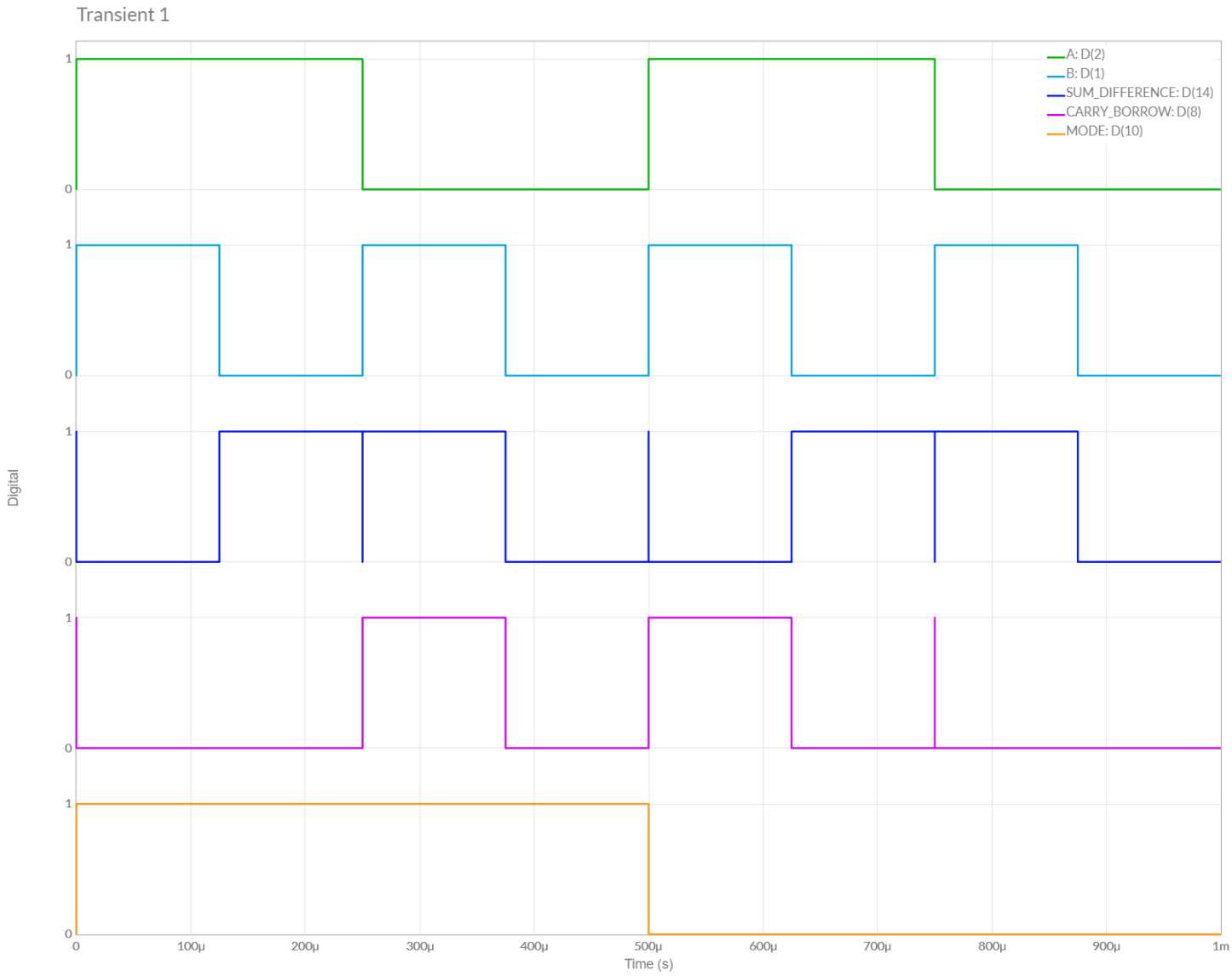
2. Design and implement the circuit in question '1' by using least number of NAND gates only.

Minimum NAND Gates Required = 9

a.) Implement the circuit in Multisim online



b.) Timing Graph



Conclusion:

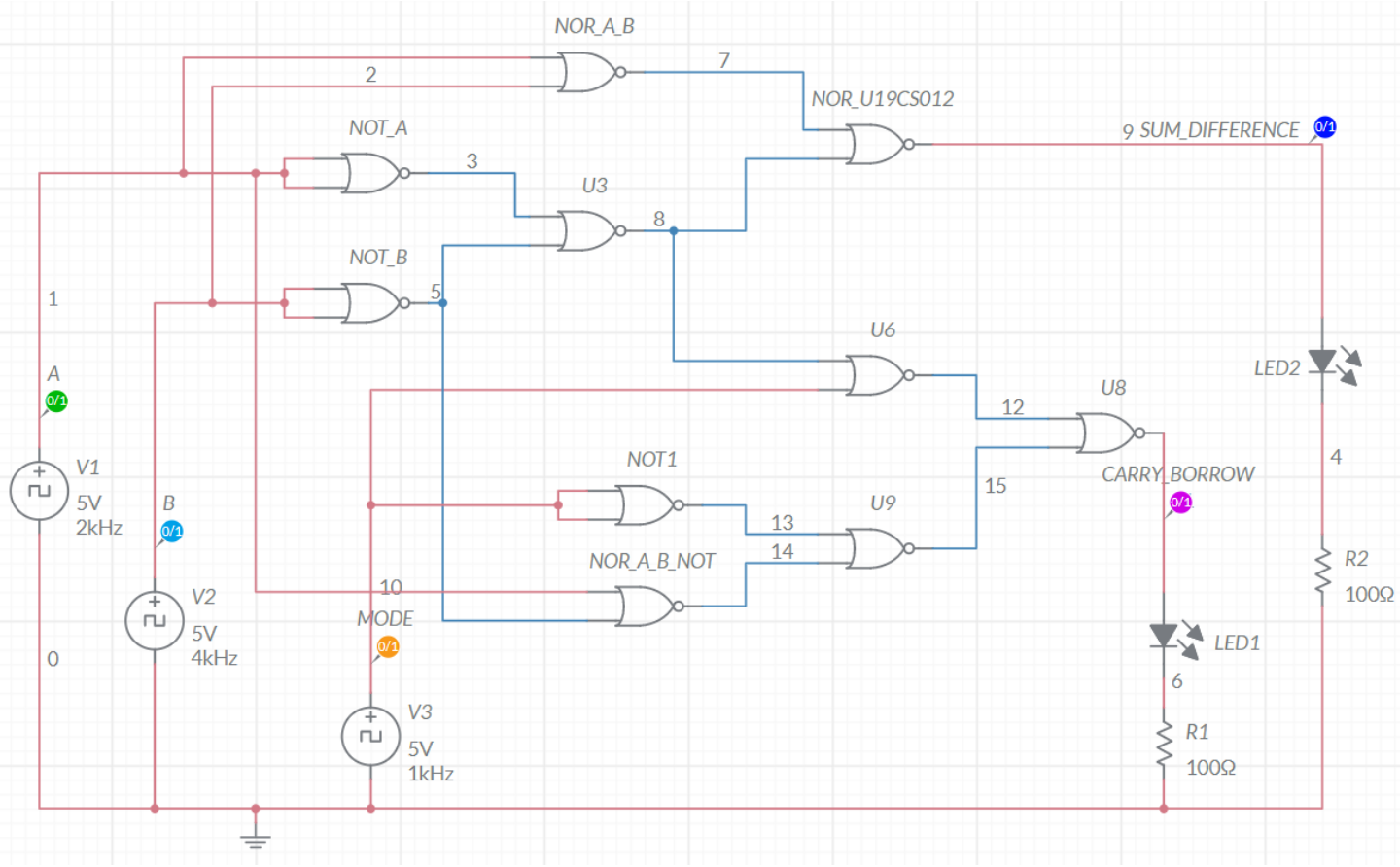
We can observe from Above Table, Both the *Theoretical* and *Multisim* Values of Given Circuit are **Equal**.

Hence, Experiment is Performed Successfully (without any Error).

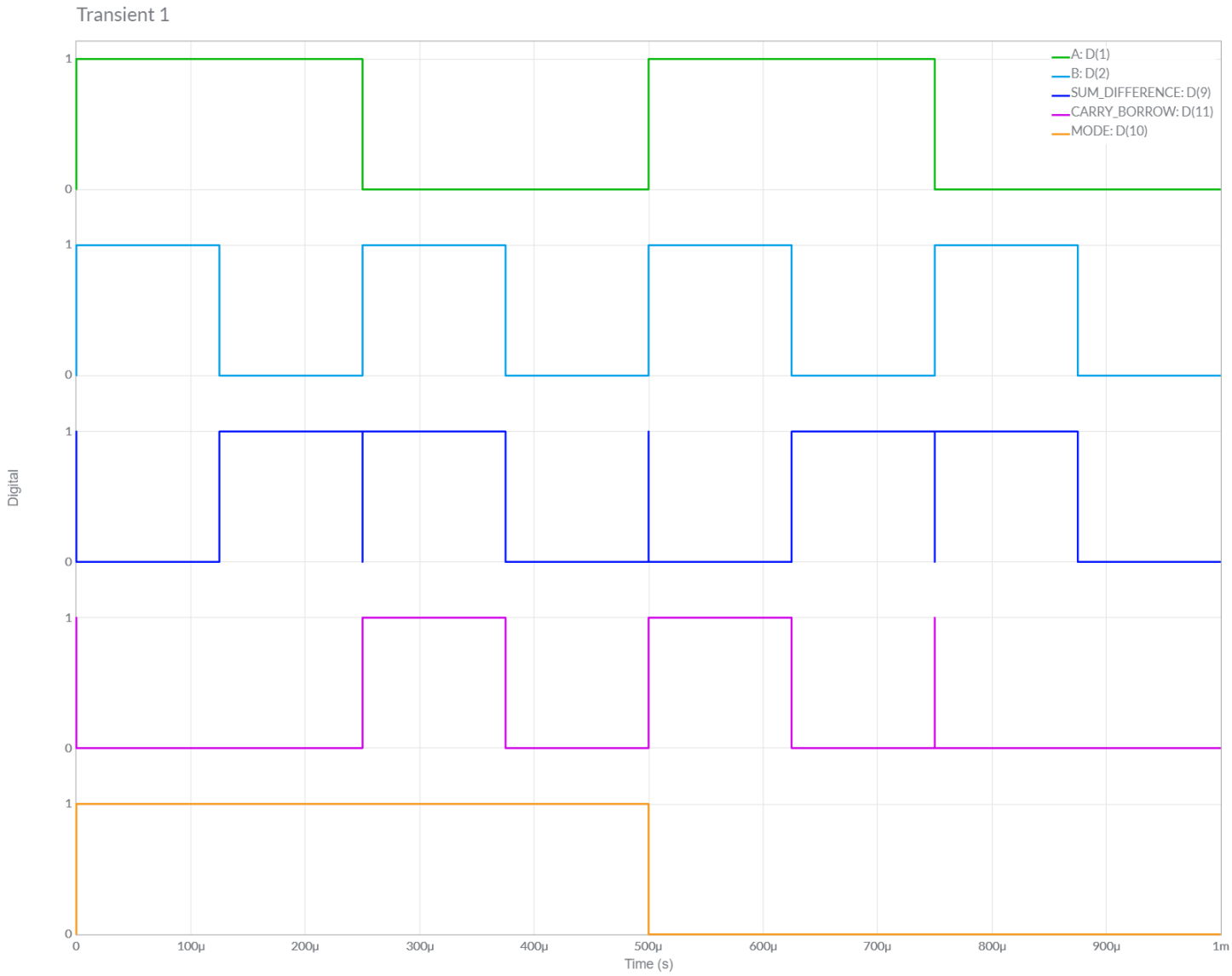
3. Design and implement the circuit in question '1' by using least number of NOR gates only.

Minimum NOR Gates Required = 10

a.) Implement the circuit in Multisim online



b.) Timing Graph



Conclusion:

We can observe from Above Table, Both the *Theoretical* and *Multisim* Values of Given Circuit are **Equal**.

Hence, Experiment is Performed Successfully (without any Error).