# EXPERIMENT-8

AIM: To design a 4-bit binary-coded decimal (BCD) adder and study it's working.

PLATFORM USED: Circuit verse

THEORY:

BCD stands for binary coded decimal. It is used to perform the addition of BCD numbers. A BCD digit can have any of ten possible four-bit representations. Suppose, we have two 4-bit numbers A and B. The value of A and B can vary from 0(0000 in binary) to 9(1001 in binary) because we are considering decimal numbers.

The output will vary from 0 to 18 if we are not considering the carry from the previous sum. But if we are considering the carry, then the maximum value of output will be 19 (i.e 9+9+1 = 19). When we are simply adding A and B, then we get the binary sum. Here, to get the output in BCD form, we will use BCD Adder.
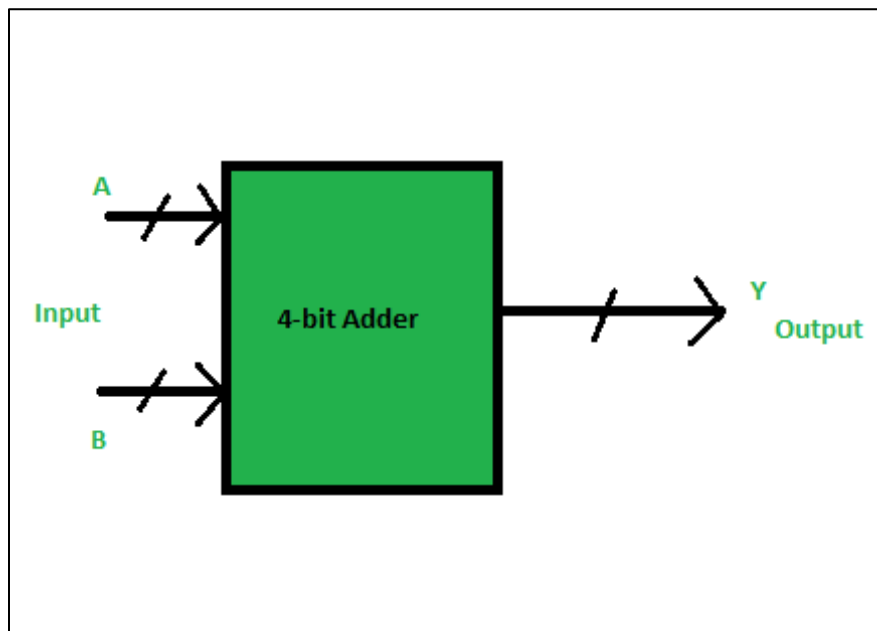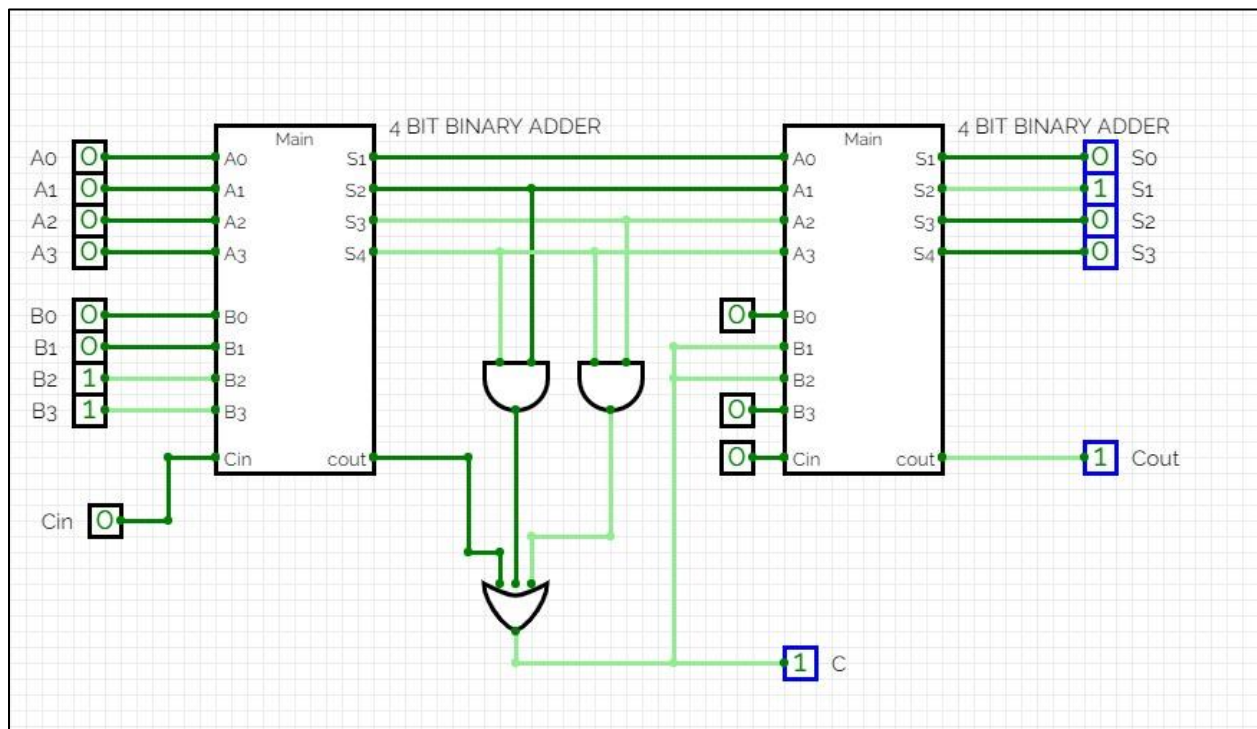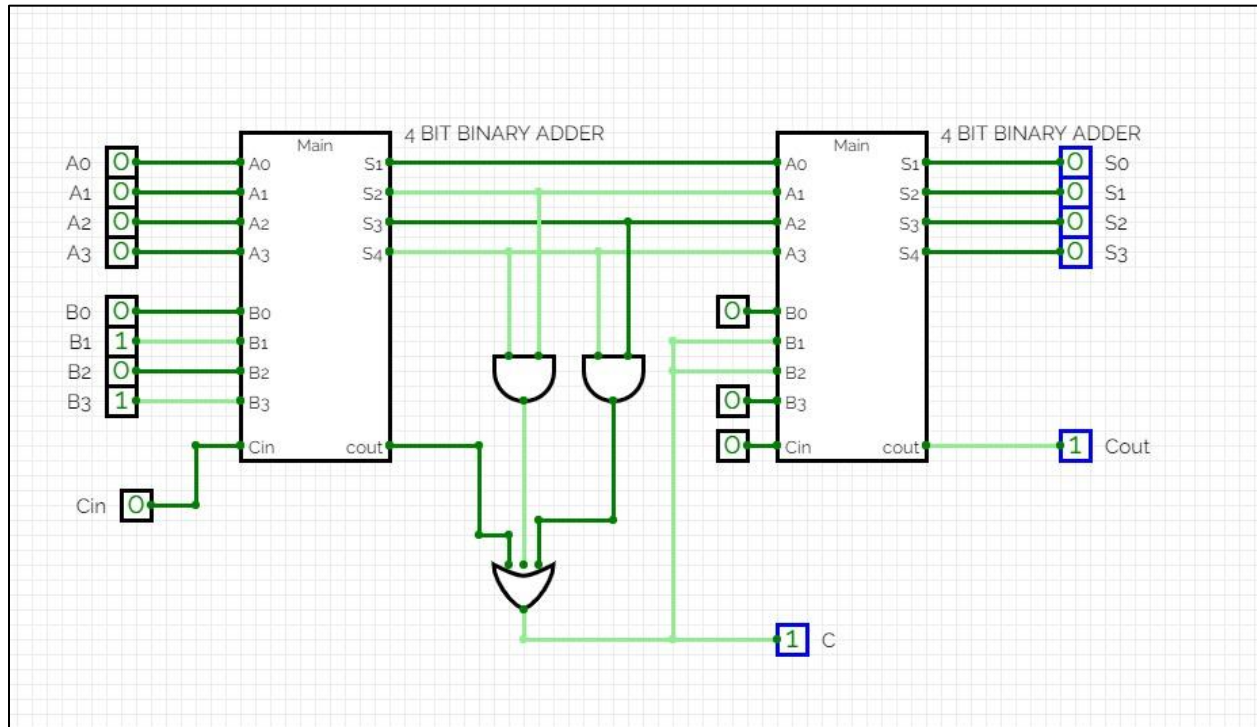

4-bit adder

| Decimal	Binary Sum					BCD Sum				
	C'	S3'	S2'	S1'	S0'	C	S3	S2	S1	S0
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	1	0	0	0	0	1
2	0	0	0	1	0	0	0	0	1	0
3	0	0	0	1	1	0	0	0	1	1
4	0	0	1	0	0	0	0	1	0	0
5	0	0	1	0	1	0	0	1	0	1
6	0	0	1	1	0	0	0	1	1	0
7	0	0	1	1	1	0	0	1	1	1
8	0	1	0	0	0	0	1	0	0	0
9	0	1	0	0	1	0	1	0	0	1
10	0	1	0	1	0	1	0	0	0	0
11	0	1	0	1	1	1	0	0	0	1
12	0	1	1	0	0	1	0	0	1	0
13	0	1	1	0	1	1	0	0	1	1
14	0	1	1	1	0	1	0	1	0	0
15	0	1	1	1	1	1	0	1	0	1
16	1	0	0	0	0	1	0	1	1	0
17	1	0	0	0	1	1	0	1	1	1
18	1	0	0	1	0	1	1	0	0	0
19	1	0	0	1	1	1	1	0	0	1

Truth table
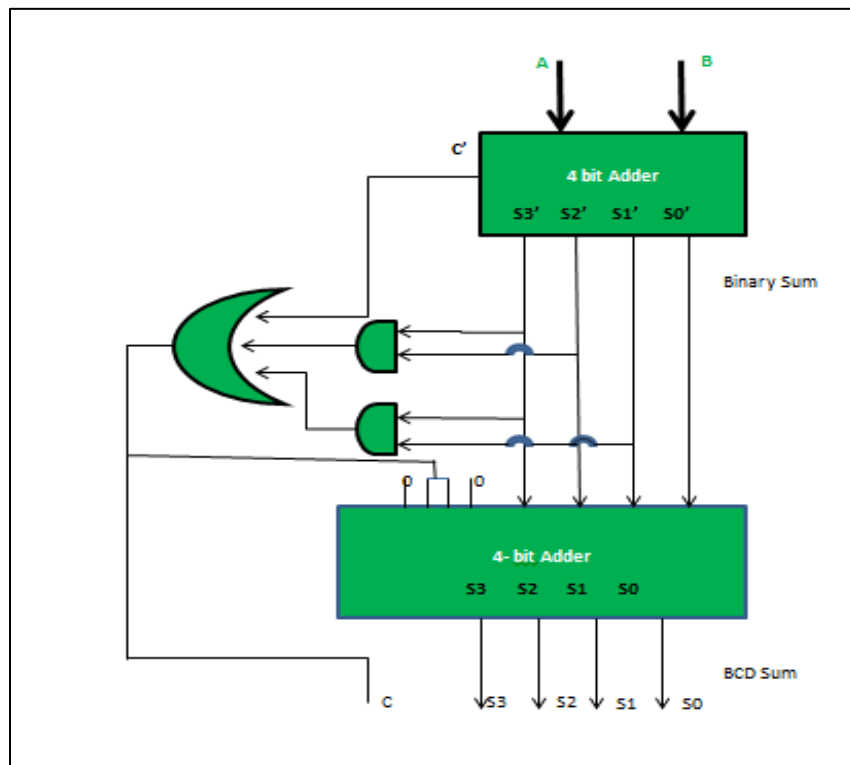
Base circuit

TIMING DIAGRAM
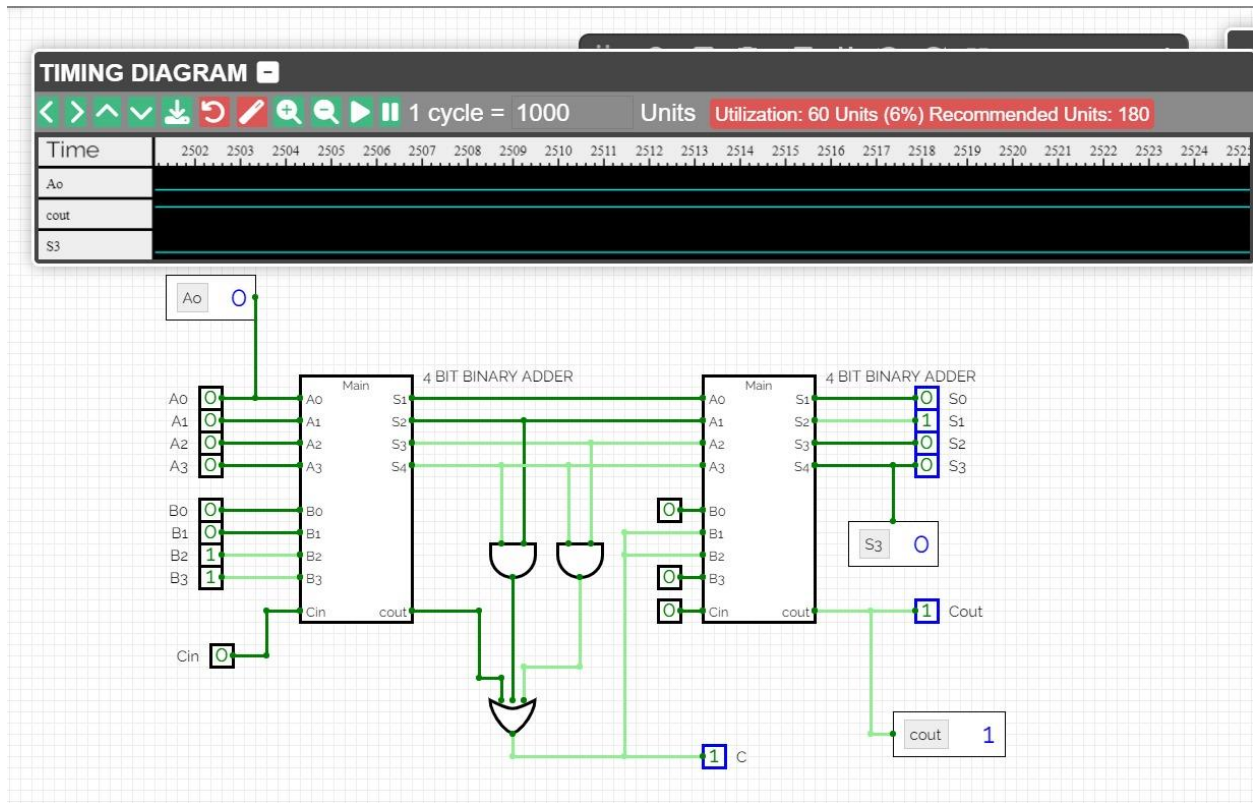
RESULT

A 4-bit binary-coded decimal (BCD) adder has been designed and studied.

Criteria	Total Marks	Marks Obtained	Comments
Concept (A)	2		
Implementation (B)	2		
Performance (C)	2		
Total	6		