Mini project on

"4-BIT BINARY SERIAL ADDER"

In

Electronics & Telecommunication Engineering

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The **serial binary adder** or **bit-serial adder** is a digital circuit that performs binary addition bit by bit. The serial full adder has three single-bit inputs for the numbers to be added and the carry in. There are two single-bit outputs for the sum and carry out. The carry-in signal is the previously calculated carry-out signal. The addition is performed by adding each bit, lowest to highest, one per clock cycle. Binary adders are implemented to add two binary numbers. When you add two 4-digit numbers 7852 and 1974,for example ,you typically start adding ,5 plus 7 equal to12 (place 2 carry 1) and so on. Similarly adding 1 plus 0 equal to 1 and 1 plus 1 equal to 10(placing 0 and carrying 1)and so n on.

For a general demonstration, both a human person and a serial adder
follow the same sequential method. Given two 4–figure numbers
A3A2A1A0 and B3B2B1B0, we add two figures at a time starting with the
least significant pair ,and soon. First, we do
A0+B0=S0.Second,we do
A1+B1+carry=S1,andsoon;wheretheS figures represent the sum :A+
B=S.

Notice that in the operationA1+B1+carry=S1,carry is not one of the
inputs being added; the inputs being added areA1andB1.Further more,
the value of carry does not depend on the inputs A1andB1.Carry is simply
a given condition ,the consequence of something that happened in the
past;namely,A0+B0.

Therefore ,if we were tasked to “build a circuit that can add any two binary
numbers using the sequential method that humans use,” we would treat
the carry variables a state variable.(In computer engineering talk, any
circuit with one or more state variables is referred to as a finite state machine)

CHAPTER 2
LITERATURE SURVEY

2.1 LITERATURE SURVEY

- 4 –Bit binary serial adder is the latest application in the stream of various adders.

- The circuit produces a two bit output. Output carry and sum are typically represented by Cout and Cin

- A full adder adds binary numbers and accounts for values carried in and out.

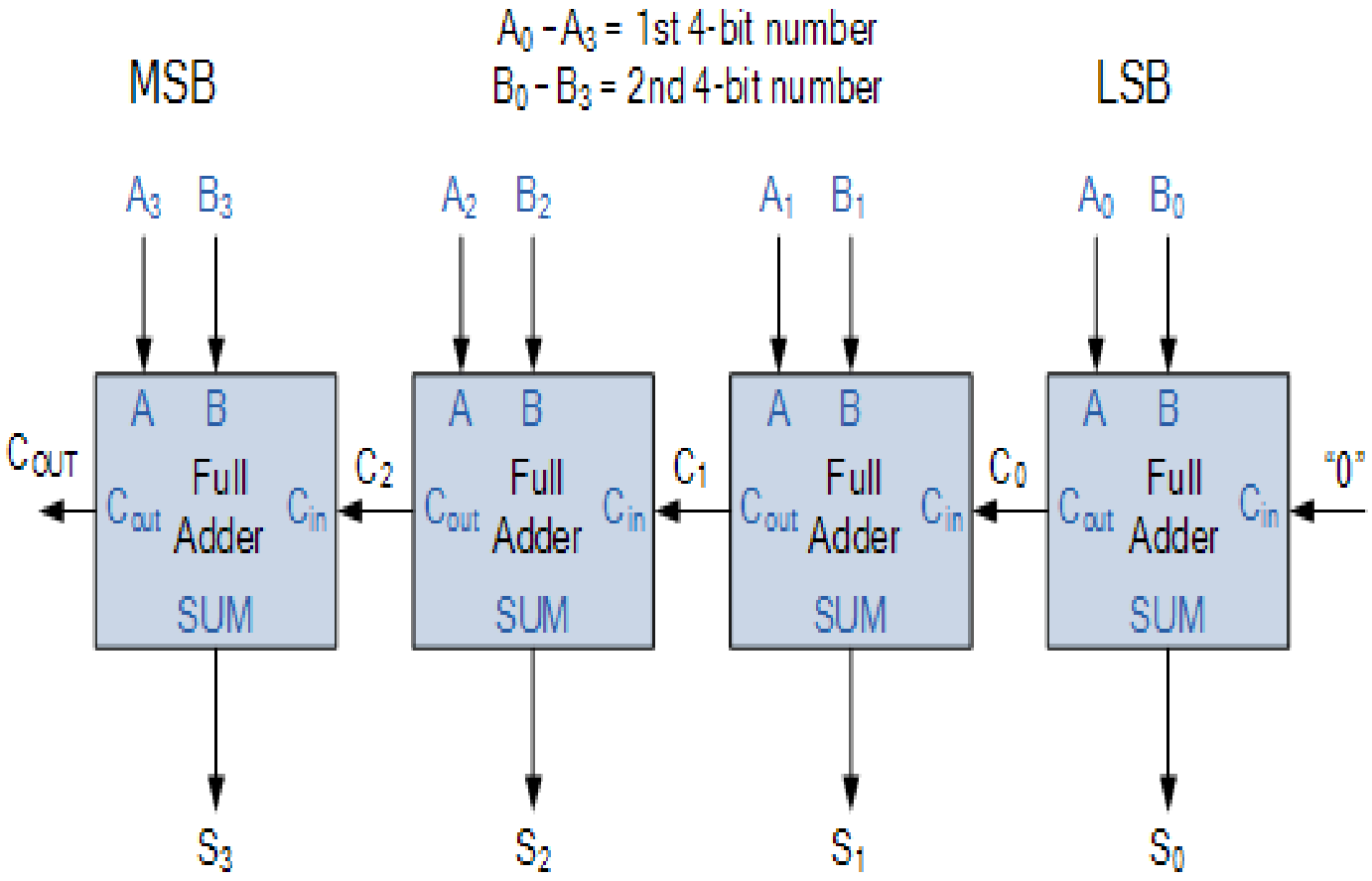
- A 4-bit binary serial adder overcomes the drawbacks and limitations of a binary full adder.

- Here, two inputs are taken and serially added with the help of a full adder .The carry output generated is reused as the carry input to the next bit

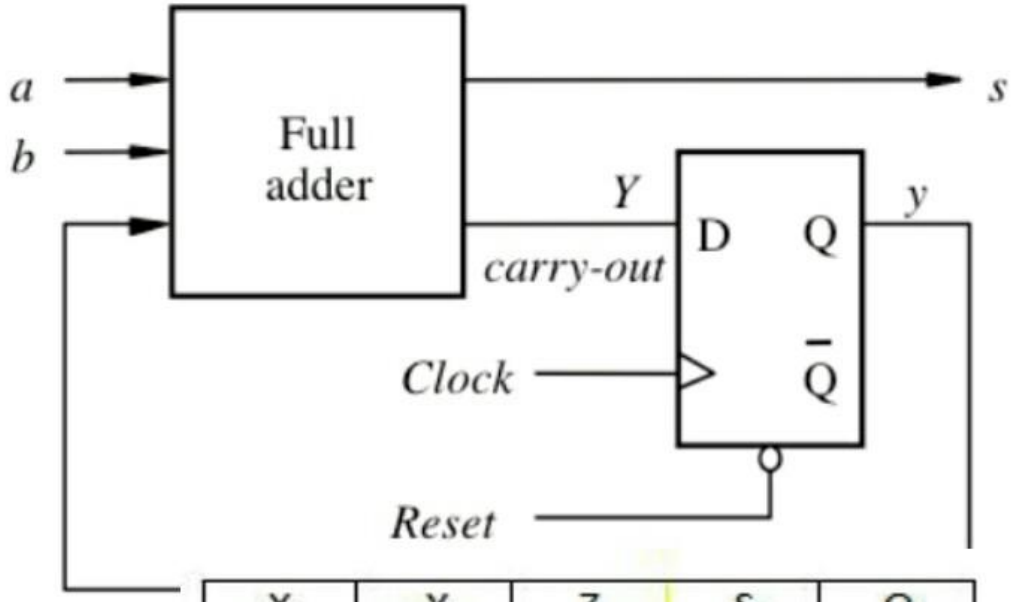
CHAPTER 3

DESIGN AND ANALYSIS

3.1 DESIGN AND ANALYSIS



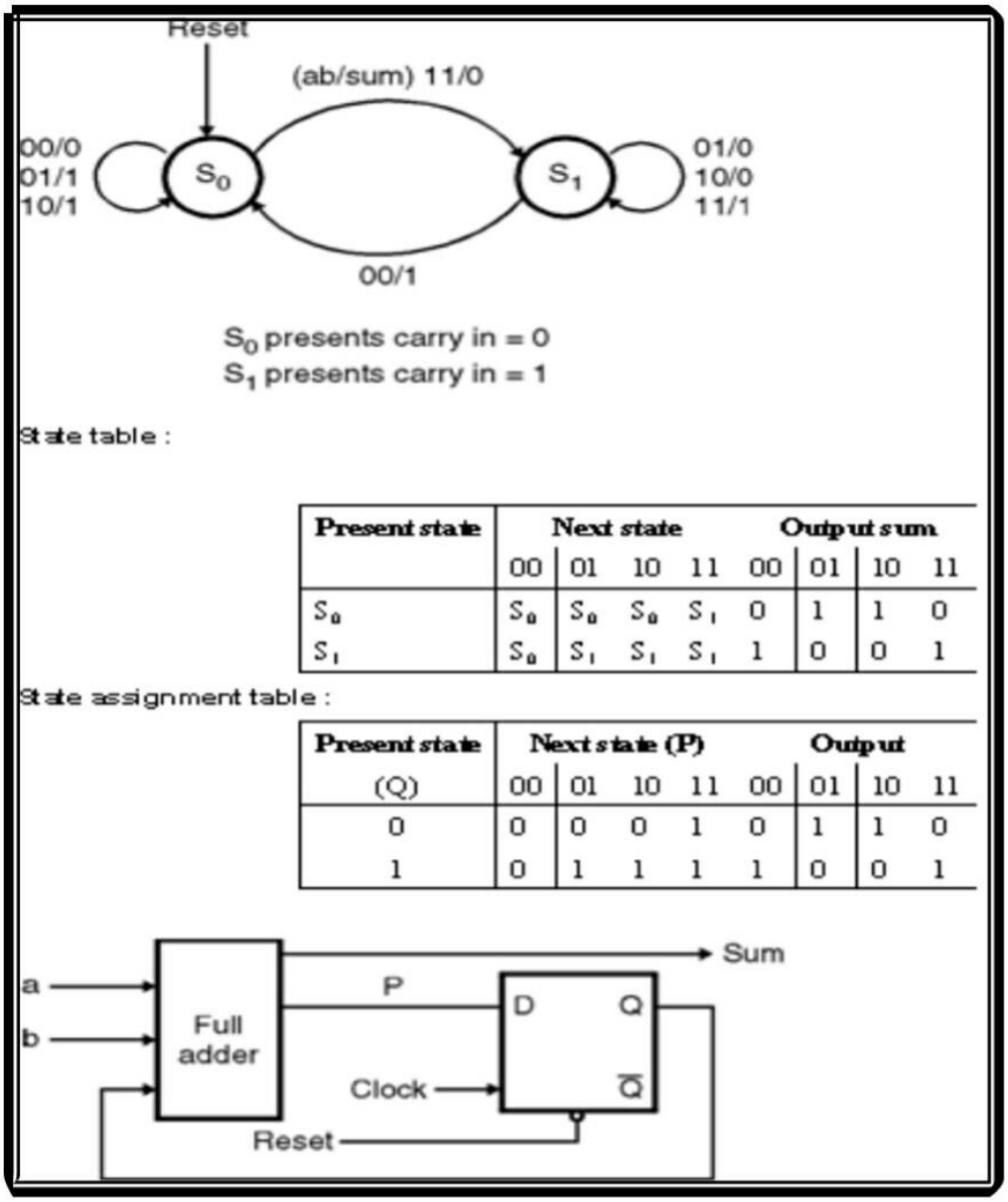
Serial Adder



CIRCUIT DIAGRAM

TRUTH TABLE FOR SERIAL ADDER

X	Y	Z	S	Q
0	0	0	0	0
0	0	1	0	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	1	1
1	1	1	1	1



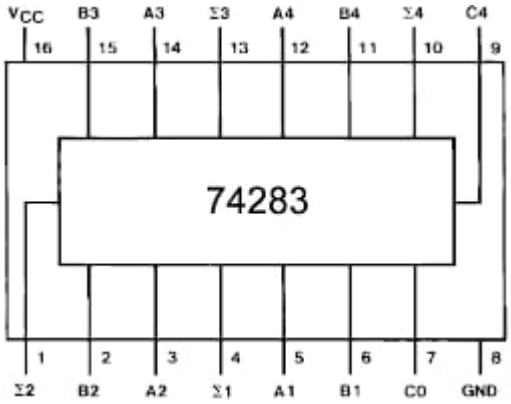
State table :

Present state	Next state				Output sum			
	00	01	10	11	00	01	10	11
S_0	S_0	S_0	S_0	S_1	0	1	1	0
S_1	S_0	S_1	S_1	S_1	1	0	0	1

State assignment table :

Present state	Next state (P)				Output			
(Q)	00	01	10	11	00	01	10	11
0	0	0	0	1	0	1	1	0
1	0	1	1	1	1	0	0	1

LIST OF COMPONENTS AND THEIR SPECIFICATIONS



APPARATUS-

1. 4-BIT BINARY ADDER IC 74283
2. D-FLIP FLOP IC 7474
3. BREADOARD
4. CONNECTING WIRES
5. CLOCK (Frequency Input-50Hz)
6. BATTERY SUPPLY 4V TO 9V
7. LED’S

PROCEDURE:

1.Shift the first 4-bit Augends into A(i.e.A1,A2,A3,A4)and add end Into B (i.e.B1,B2,B3,B4) This is done by
(i)Shifting the augend through the serial input;
(ii)Clearing A and the D flip-flop;
(iii)Shift the add end through the serial input;

2.Clear the D flip-flop and run the adder for four cycle to obtain the sum.

3.The carry output generated would be fed into the input of the next cycle.

4.Observe the out put through the lightening LEDs in the binary form.

CHAPTER 4

IMPLEMENTATION

4.1 IMPLEMENTATION/SIMULATION

Serial adder is a sequential circuit, consisting of a flip-flop and a full adder.
A teach clock cycle ,it is taking the result of the previous bit addition result
Carry stored in the flip- flop, calculating the sum result and storing the Carry to the flip flop for the next calculation .In this manner ,the input data
Have to be fed serially, synchronized by the clock, and the result is read Serially as well.

CHAPTER 5

RESULT AND DISSCUSSION

5.1 RESULT-

Take two numbers to show the result.

For eg-5+9=14

- In decimal form: X=5, Y=9, S=14
- In binary form :X=0101, Y=1001, S=1110

- Adiition of each step-

Cin	X	Y	S	Cout
0	1	1	0	1
1	0	0	0	1
0	1	0	1	0
0	0	1	1	0

5.2 DISCUSION-

- The only disadvantage of 4-bit serial adder circuit is it is bit Restricted .It can add only 4-bitbinarynumbers.
- The obvious benefits are reduced gate count and power Consumption .With a parallel adder ,you need a full adder for every Bit in you roper and .That can be some what expensive in a small Scale integration setting.
- A serial adder only performs addition bit by bit in stead of a whole Word at once. This means you only need a single adder. Granted, you'll possibly need additional timing circuitry around it, and it'll be slower.
- But it's cheaper to build a 4-bit serial adder.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION-

Thus ,we can conclude that a serial binary adder or bit-serial adder is a digital circuit that performs binary addition bit by bit .The serial full adder has three single-bit inputs for the numbers to be added and the carry in .There are two single-bit outputs for the sum and carry out. The carry-in signal is the previously calculated carry-out signal .The addition is performed by adding each bit, lowest to highest ,one per clock cycle. Serial binary addition is done by a flip-flop and a full adder .The flip-flop Takes the carry-out signal one a clock cycle and provide sits value as The carry-in sign alone the next clock cycle .After all of the bits of the input open and shave arrived, all of the bits of the sum have come out of the sum output.

6.2 FUTURE SCOPE-

Adder are digital logic devices that add or sum binary numbers together.While you might find some applications where they are used by themselves you would more commonly find them used as a component in a arithmetic logic unit(ALU) which itself is a component in a central processing unit(CPU).As a result any electronic device you can think of that as a micro controller or a CPU in it is using an adder .Generally speaking most home electronics are probably going to use 8bit micro controllers or 32/64 bit CPUs. So if you had a 4 bit adder it would most likely be used with a second 4 bit adder to form an8 bit adder.

Examples include: Smart thermostats , appliances such as washing Machines or driers that have digital read outs, digital alarm clocks, digital wrist watches, digital bathroom scales, game consoles, network equipment such as routers or wifi access points.

REFRENCES