UNIVERSITY OF ASIA PACIFIC

Department of Computer Science & Engineering

Course Title – Digital Logic & System Design Lab

Course Code – CSE 210

Experiment No. – 04 (part - ii)

Experiment name – Adder & Sub-tractor with #IC-7483 & Full Adder.

SUBMITTED BY

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Section – A_1

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PROBLEM STATEMENT:

d. Design 4-bit Adder- Subtractor using #IC-7483
e. Design a 4-bit Full Adder with Logic gate.

OBJECTIVE: The objective of the experiment is to design Adder & Sub-tractor at a time using #IC-7483 and design Adder &Sub-tractor with Full Adder.

APPARATUS:

- IC-7408(AND Gate)
- IC-7432(OR Gate)
- IC-7404(NOT Gate)
- IC-7486(X-OR)
- IC-7483(4-bit Parallel Adder)
- Logic Display
- Logic Switch

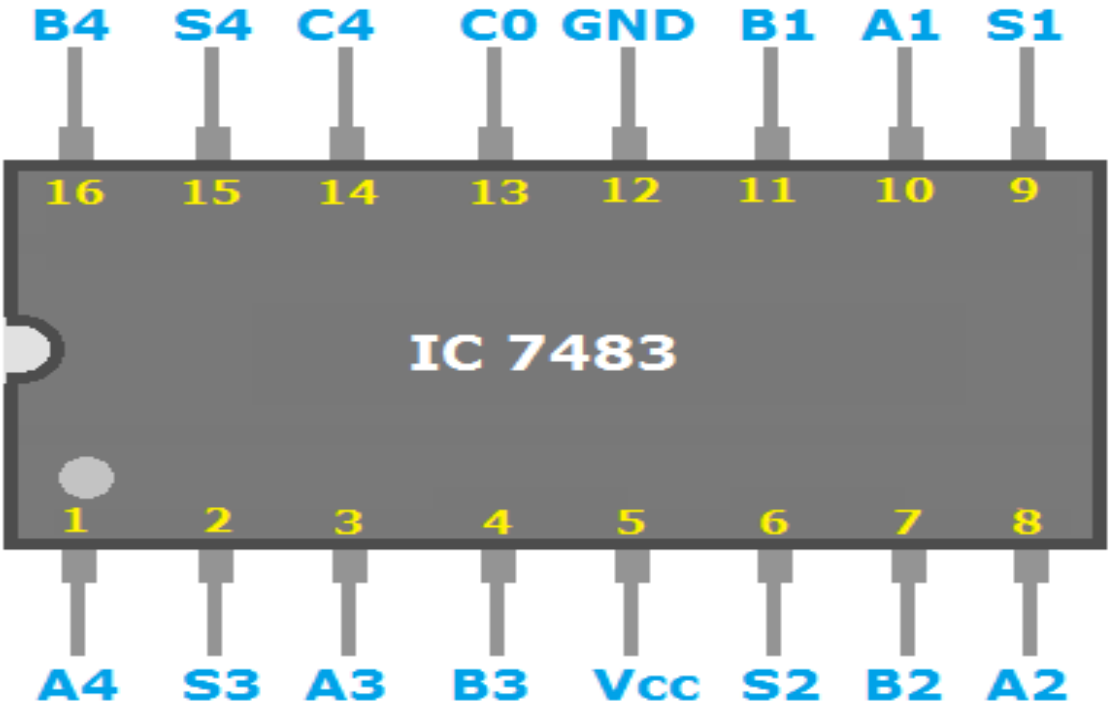
INTRODUCTION:

An adder is a digital circuit that performs addition of numbers. In many computers and other kinds of processors adders are used in the arithmetic logic units or ALU.

To use IC-7483 as an Adder & Subtractor at a time, we have to use XOR gate. We just have to connect the inputs of B with XOR gate as 1st input of XOR gate, and the 2nd input of those XOR gate will be 1 and Carry-in will be 1. In subtractor the S_4 or the Carry-out will count as Carry Bit. IC 7483 is a 4 bit parallel adder which consists of four interconnected full adders along with the look ahead carry circuit.

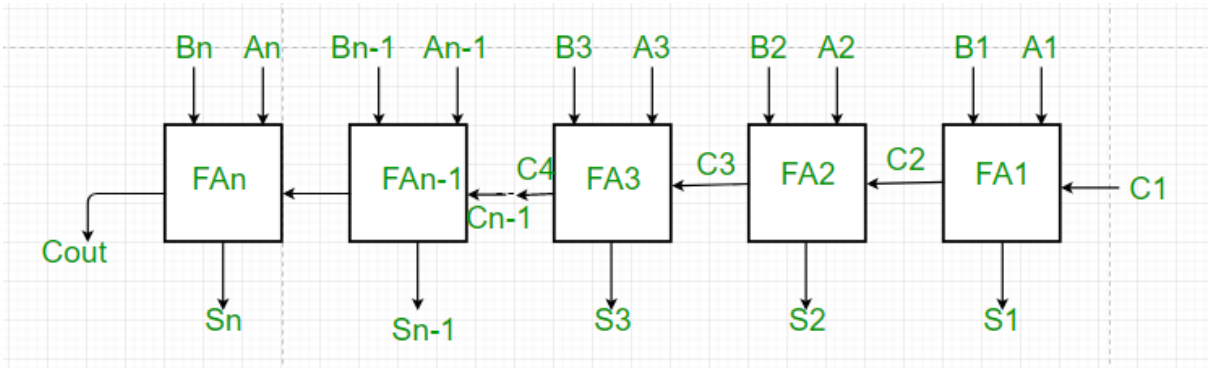
We will design adder-subtractor with full adders.

PIN CONFIGURATION:



IC 7483 Pin Diagram

BLOCK DIAGRAM:



OPERATION:

ADDER

C_5	C_4	C_3	C_2	C_1
	A_4	A_3	A_2	A_1
+	B_4	B_3	B_2	B_1
S_5	S_4	S_3	S_2	S_1

SUBTRACTOR

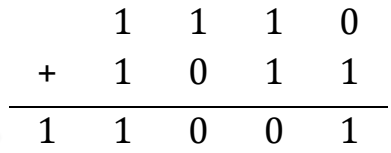
C_5	C_4	C_3	C_2	C_1
	A_4	A_3	A_2	A_1
+	$\overline{B_4}$	$\overline{B_3}$	$\overline{B_2}$	$\overline{B_1}$
+				1
S_5	S_4	S_3	S_2	S_1

❖ ADDER + SUBTRACTOR

Addition Operation: Cin =0.

A= 14 -> 1 1 1 0

B = 11 -> 1 0 1 1



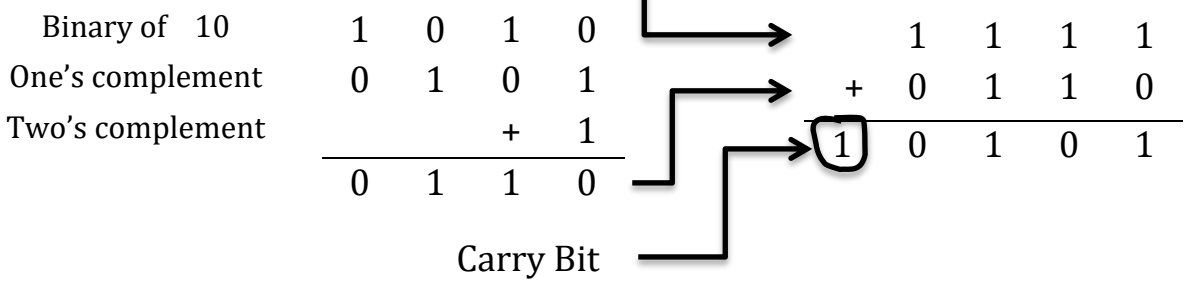
14 + 11 = 25

$(1\ 1\ 0\ 0\ 1)_2 = (25)_{10}$

Subtraction Operation: Cin =1.

A= 15 -> 1 1 1 1

B = 10 -> 1 0 1 0

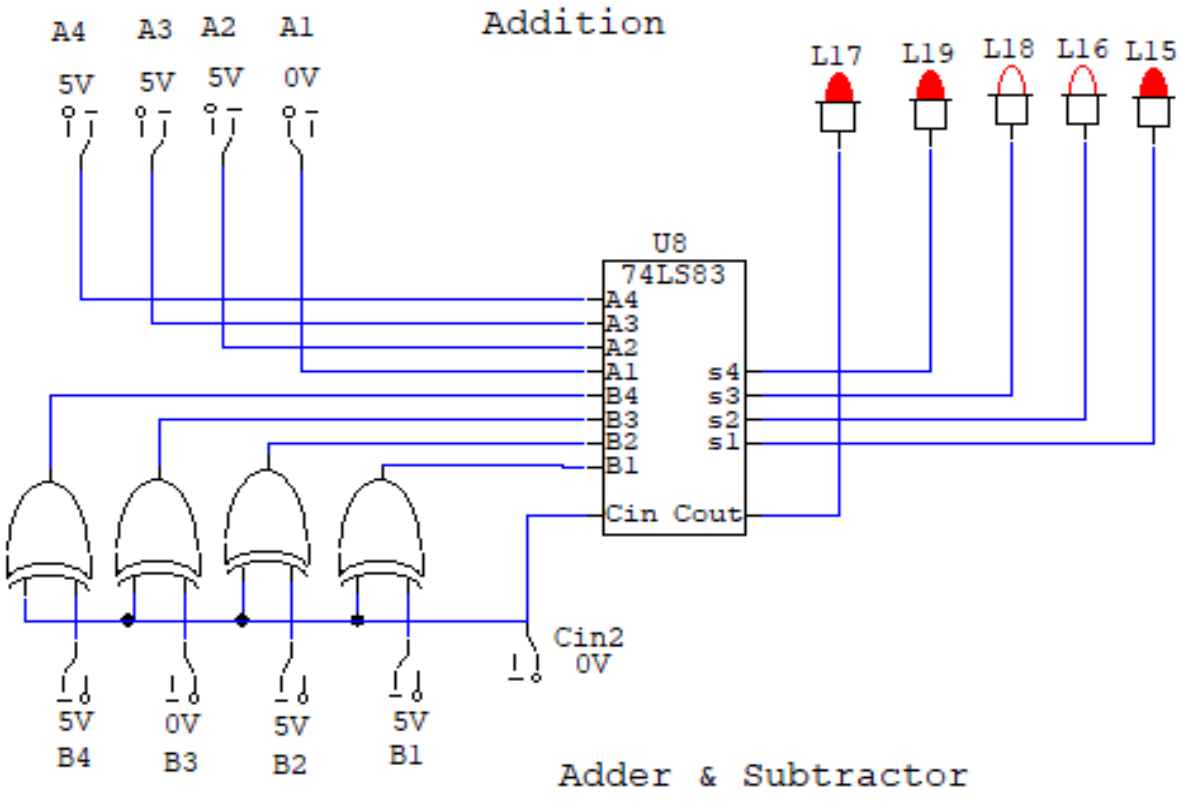


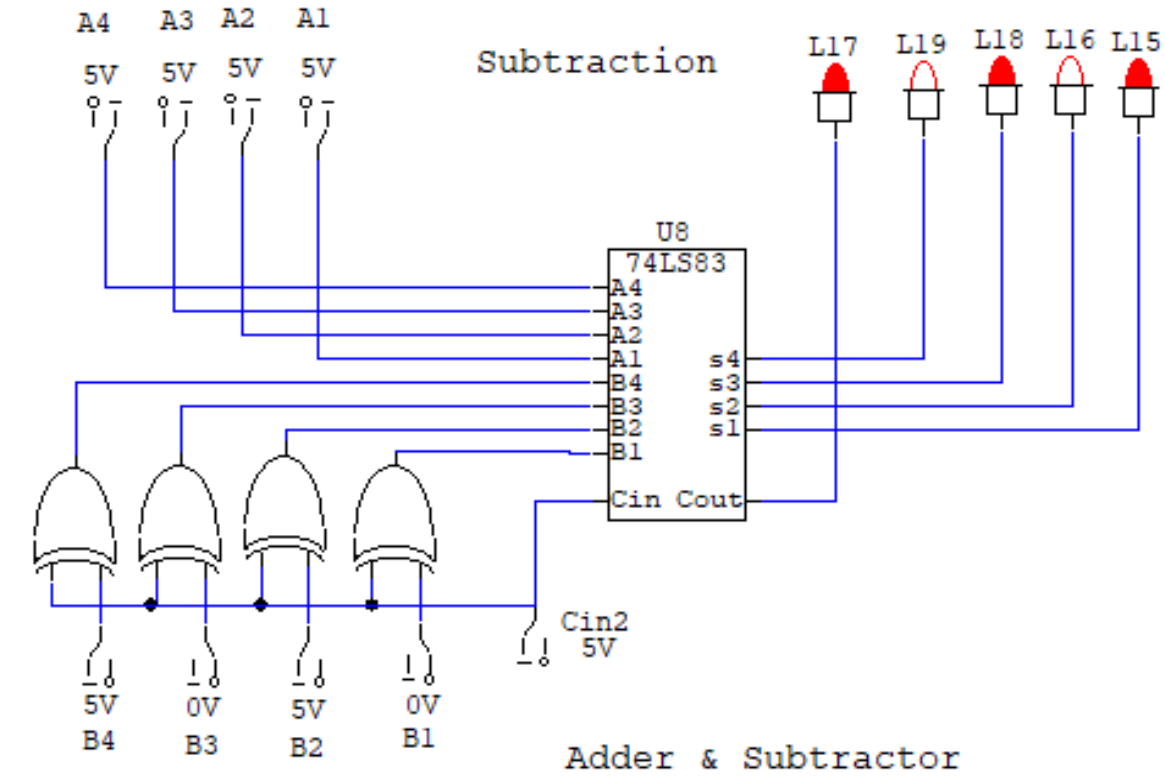
In subtraction the carry bit will not be counted. So the output will be

$(0\ 1\ 0\ 1)_2 = (5)_{10}$

A – B = 15 – 10 = 5

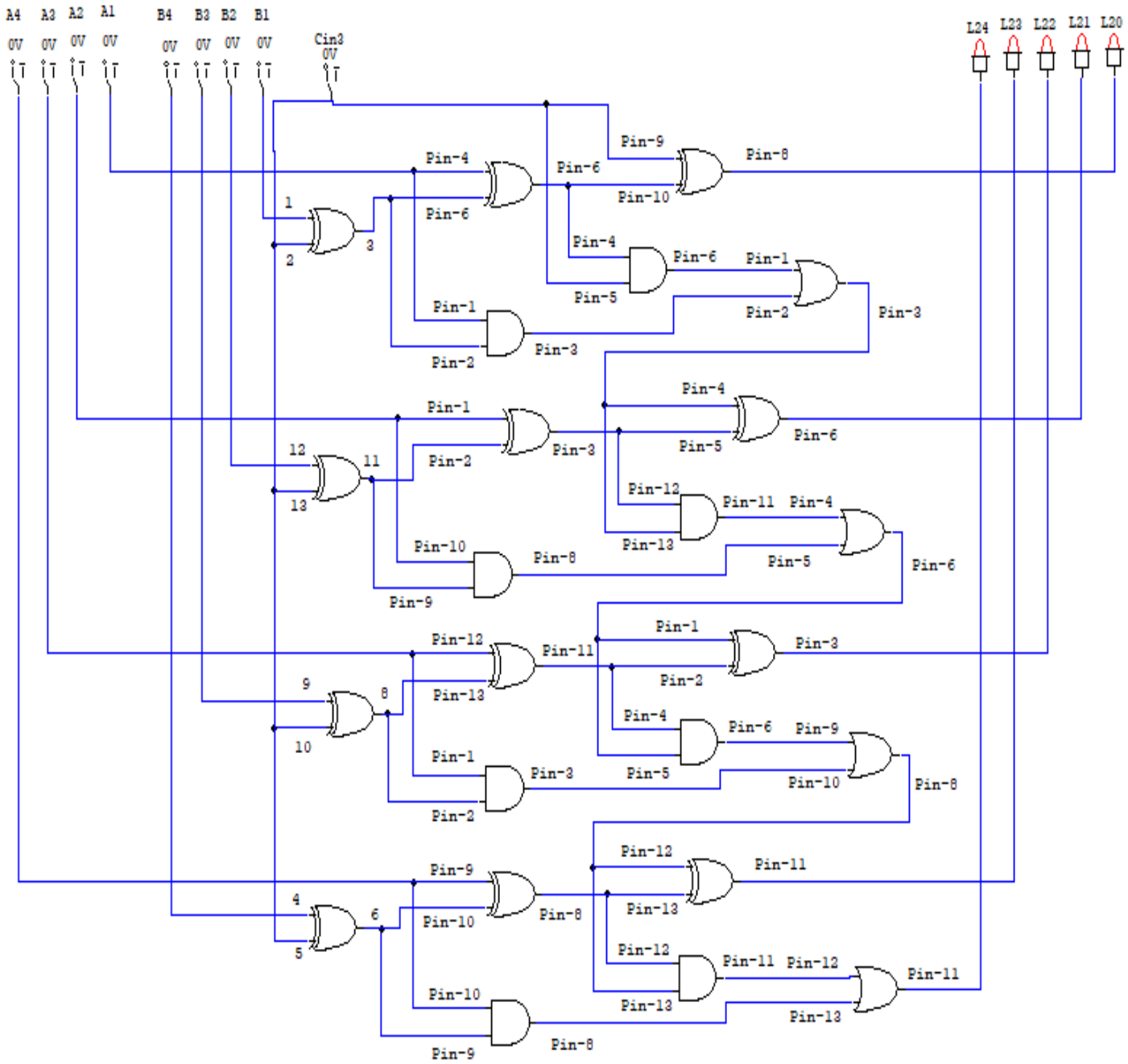
CIRCUIT DIAGRAM:

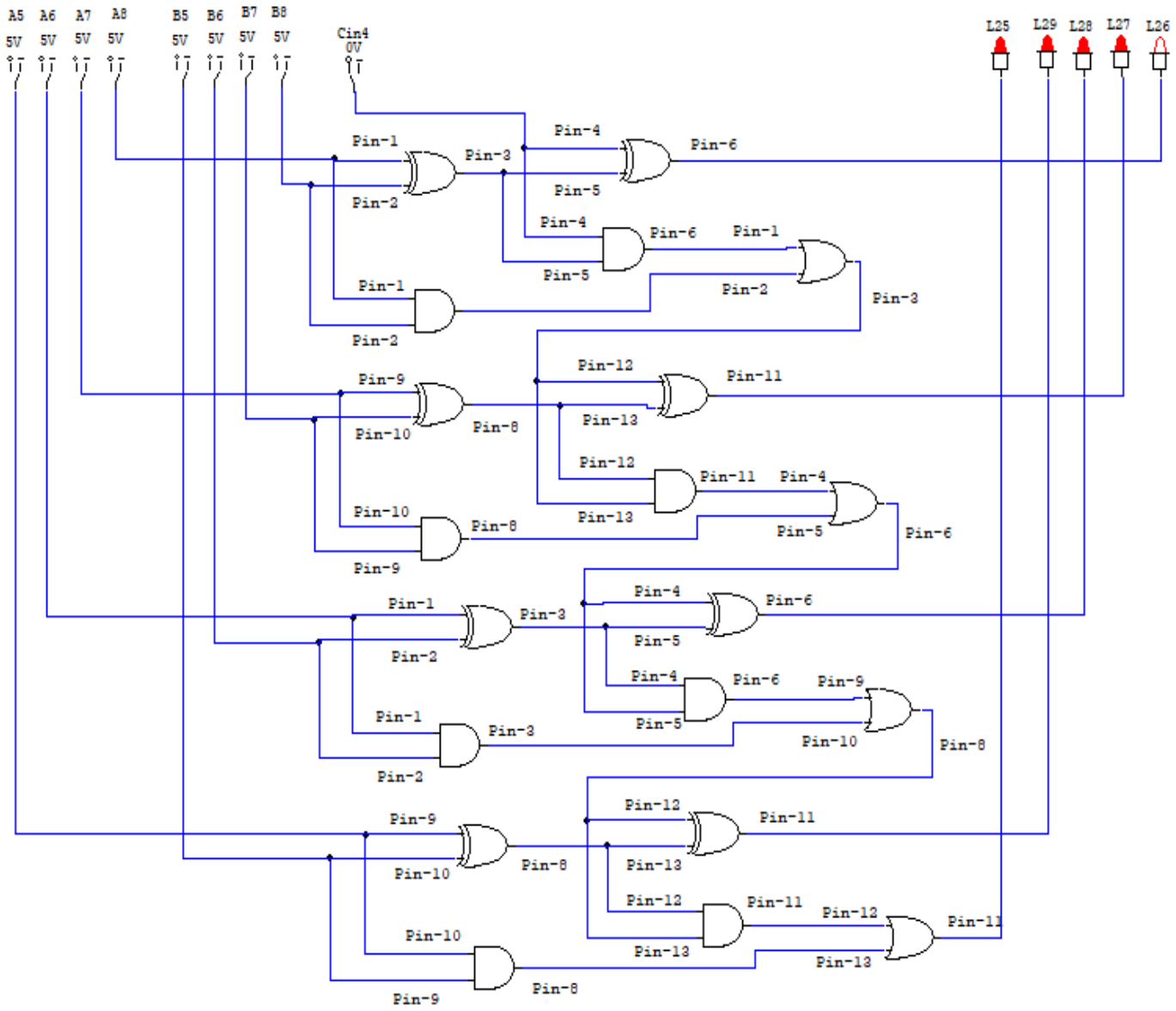




❖ DESIGNING 4-BITS FULL ADDER WITH LOGIC GATES

CIRCUIT DIAGRAM:





DISCUSSION: In this experiment discussed about 4 bit parallel adder. We have used 4-bit parallel adder IC#7483 for Addition and Subtraction at a time. We also designed 4-bit parallel adder-subtractor with full adder.