

EXPT NO. : 8

## AIM:

Construction of composite adder-subtractor unit and Calculate and compare the results of composite unit using test cases

## APPARATUS REQUIRED:

Sl. No.	COMPONENT	SPECIFICATION	QTY.
1.	4-BIT BINARY FULL ADDER	IC 7483	1
2.	X-OR GATE	IC 7486	1
3.	NOT GATE	IC 7404	1
4.	BREAD BOARD	-	1
5.	PATCH CORDS	-	-
6.	POWER SUPPLY WITH LOGIC PROBE	-	1

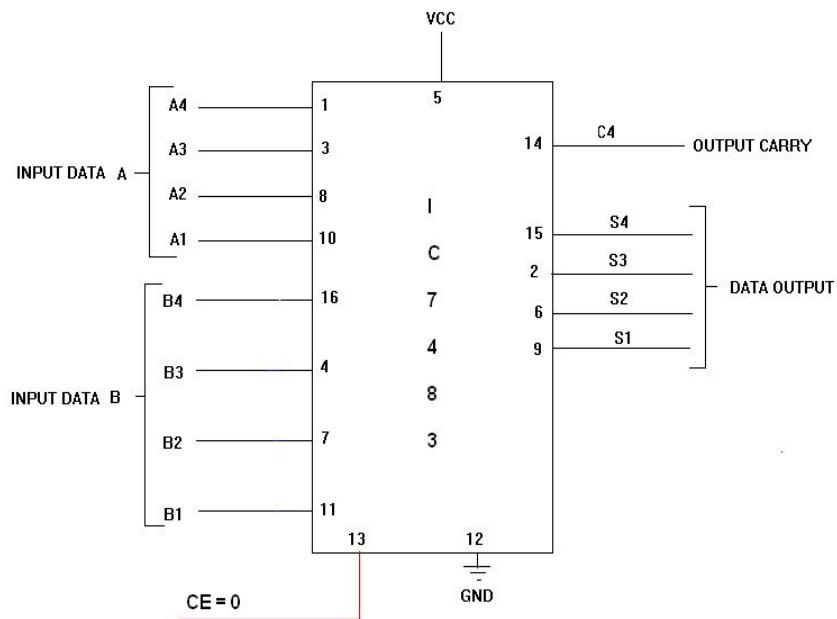
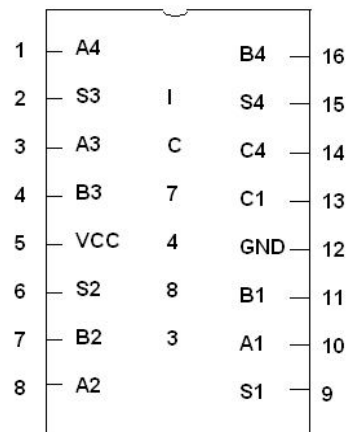
## THEORY:

**4-BIT BINARY ADDER:** A binary adder is a digital circuit that produces the arithmetic sum of two binary numbers. It can be constructed with full adders connected in cascade, with the output carry from each full adder connected to the input carry of next full adder in chain. The augends bits of 'A' and the addend bits of 'B' are designated by subscript numbers from right to left, with subscript 0 denoting the least significant bits. The carries are connected in chain through the full adder. The input carry to the adder is  $C_0$  and it ripples through the full adder to the output carry  $C_4$ .

**4-BIT BINARY SUBTRACTOR:** The circuit for subtracting A-B consists of an adder with inverters, placed between each data input 'B' and the corresponding input of full adder. The input carry  $C_0$  must be equal to 1 when performing subtraction.

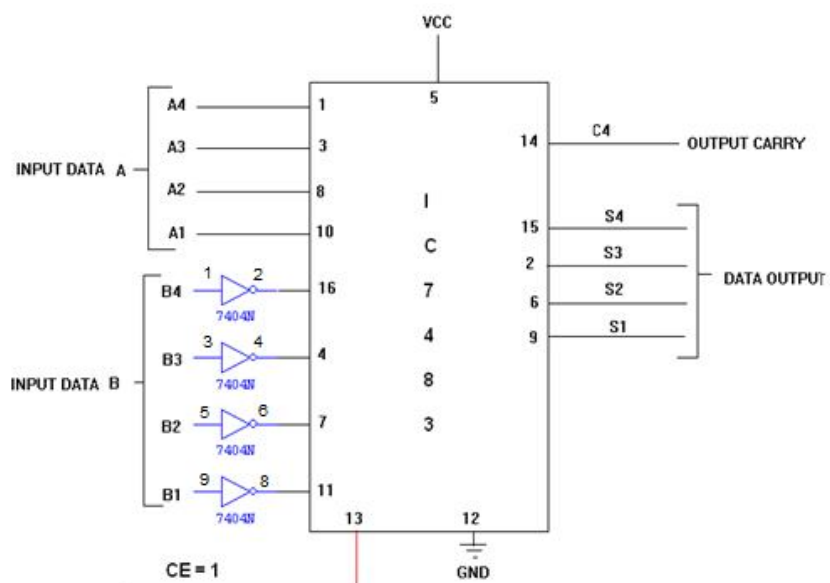
**4-BIT BINARY ADDER/SUBTRACTOR:** The addition and subtraction operation can be combined into one circuit with one common binary adder. The mode input M controls the operation. When M=0, the circuit is adder circuit. When M=1, it becomes subtractor.

## PIN DIAGRAM FOR IC 7483:

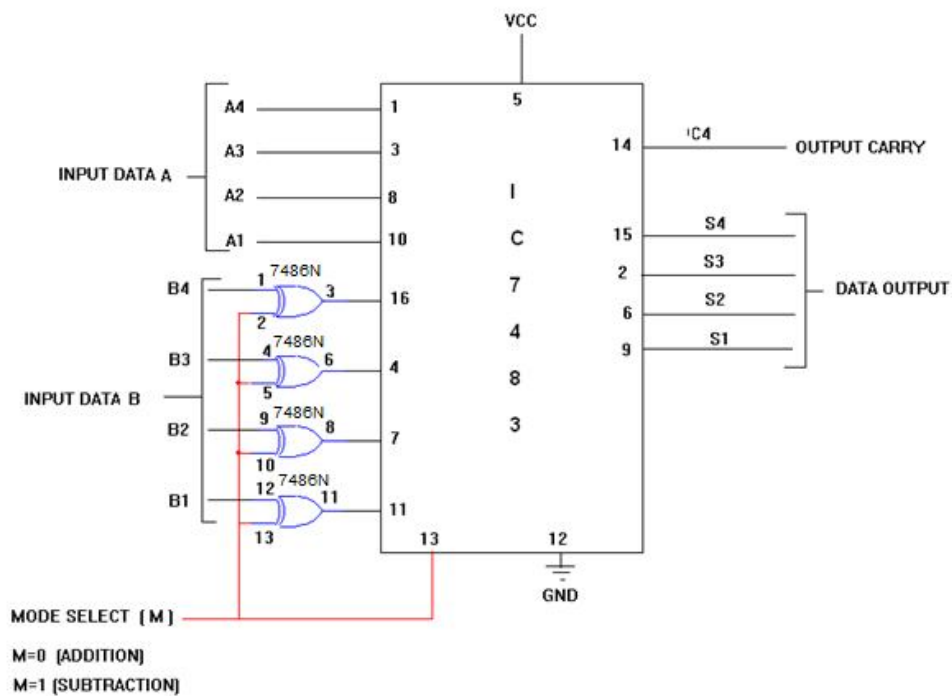


## LOGIC DIAGRAM: 4-BIT BINARY ADDER

## 4-BIT BINARY SUBTRACTOR



## 4-BIT BINARY ADDER/SUBTRACTOR



## PROCEDURE:

- (i) Connections are given as per circuit diagram.
- (ii) Logical inputs are given as per circuit diagram.
- (iii) Observe the output and verify the truth table.

## SAMPLE TABLE:

Sl. No.	Circuit	Input A				Input B				CE	M	C <sub>4</sub>	Output S			
		A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>				S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>
1.	4-BIT BINARY ADDER	1	1	0	0	0	1	0	1	0		1	0	0	0	1
2.	4-BIT BINARY SUBTRACTOR	1	0	1	1	0	1	1	0	1		1	0	1	0	1
3.	4-BIT BINARY ADDER / SUBTRACTOR	0	1	1	1	1	0	1	0		0	1	0	0	0	1
											1	0	1	1	0	1

## OBSERVATION TABLE:

Sl. No.	Circuit	Input A				Input B				CE	M	C <sub>4</sub>	Output S			
		A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	B <sub>3</sub>	B <sub>2</sub>	B <sub>1</sub>	B <sub>0</sub>				S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>
1.	4-BIT BINARY ADDER									0						
2.	4-BIT BINARY SUBTRACTOR									1						
3.	4-BIT BINARY ADDER / SUBTRACTOR										0					
											1					