EXPERIMENT NO. 7

ALU & 4-BIT BINARY ADDER

Learning Outcomes

1. Understand the working of ALU with IC 7485
2. Understand the working of 4-bit binary parallel adder using IC 7483

Components Required

74181- 4-bit ALU IC

IC 7483 - 4-bit binary parallel adder

Run #01: ALU

IC 74181 is a 4-bit ALU. Refer its pin configuration in Datasheet.The operation performed by the IC is selected by the M and S3 – S0 inputs. The function table of the IC is given below.

Table 7.1: Function table for ALU IC 74181

Inputs (S3 S2 S1 S0)	Function F for M = 0	Function F for M = 1
0000	A minus 1 plus Cin	A’
0001	A.B minus 1 plus Cin	A’ + B’
0010	A.B’ minus 1 plus Cin	A’ + B
0011	1111 plus Cin	1111
0100	A plus (A + B’) plus Cin	A’. B’
0101	A.B plus (A + B’) plus Cin	B’
0110	A minus B minus 1 plus Cin	A ⊕ B’
0111	A + B’ plus Cin	A + B’
1000	A plus (A + B) plus Cin	A’. B
1001	A plus B plus Cin	A ⊕ B
1010	A. B’ plus (A+ B) plus Cin	B
1011	A + B plus Cin	A + B
1100	A plus A plus Cin	0000
1101	A. B plus A plus Cin	A. B’
1110	A. B’ plus A plus Cin	A. B
1111	A plus Cin	A

Apply the following inputs to A, B, S, M and Cin. Note down your observations regarding the outputs F and Cout in following observation table. Observe the outputs using LEDs.

Table 7.2: Observation table for Run#01

S3 S2 S1 S0	M	Cin	Function?	A	B	F	Cout
1001	0	0		0101	1001		
1001	0	1		0101	1001		
1001	1	1		0101	1001		
1001	1	0		0101	1001		
1100	0	0		1000	1000		
1100	0	1		1000	1000		
1100	1	1		1000	1000		
1100	1	0		1000	1000		
0110	0	1		1110	0111		
0110	0	0		1110	0111		
0001	1	0		0001	1000		
0001	1	1		0001	1000		

Run # 02: Binary Adder. 7483 is a 4-bit binary parallel adder. Its pin diagram is shown below.

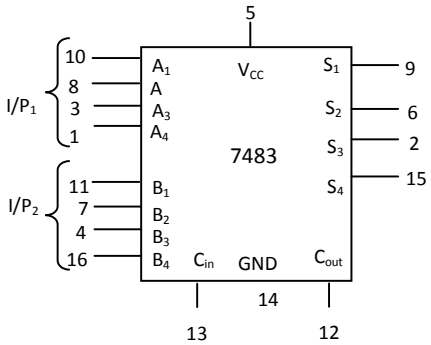

Figure 7.1: Pin assignment of IC 7483

Apply different input combinations to A, B and C_{in}. Check the output sum and carry.

Table 7.3: Observations for Run #02

A	B	C	Sum	Carry
0001	0011	0		
0001	0011	1		
1001	1001	0		
1001	1001	1		
0100	0101	0		
0100	0101	1		