EXPT NO. : 12

AIM:

To demonstrate ALU or Arithmetic and Logical Unit as a digital circuit to perform several arithmetic operations using IC 74181.

APPARATUS REQUIRED:

Sl. No.	COMPONENT	SPECIFICATION	QTY.
1.	4-BIT ALU	IC 74181	1
3.	BREAD BOARD	-	1
4.	PATCH CORDS	-	-
4.	POWER SUPPLY WITH LOGIC PROBE	-	1

THEORY: ALU or Arithmetic and Logical Unit is a digital circuit to do arithmetic operations like addition, subtraction, division, multiplication and other logical operations.

Required functionality of ALU (inputs and outputs are active high)

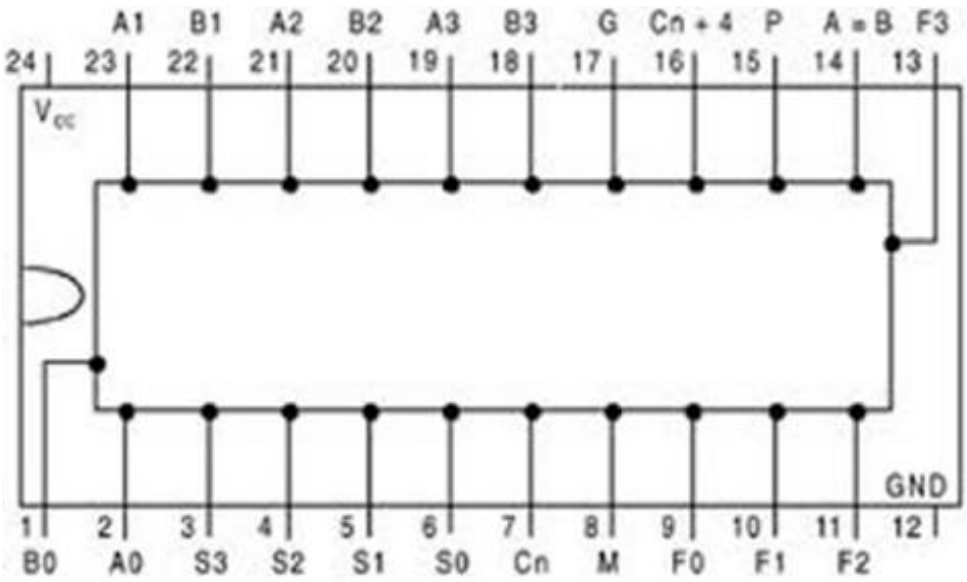
Mode Select **F_n for active HIGH operands**

Inputs				**Logic**	**Arithmetic (note 2)**
S3	S2	S1	S0	(M = H)	(M = L) **(C_n=L)**
L	L	L	L	A'	A
L	L	L	H	A'+B'	A+B
L	L	H	L	A'B	A+B'

L	L	H	H	Logic 0	minus 1
L	H	L	L	(AB)'	A plus AB'
L	H	L	H	B'	(A + B) plus AB'
L	H	H	L	A ⊕ B	A minus B minus 1
L	H	H	H	AB'	AB minus 1
H	L	L	L	A'+B	A plus AB
H	L	L	H	(A ⊕ B)'	A plus B
H	L	H	L	B	(A + B') plus AB
H	L	H	H	AB	AB minus 1
H	H	L	L	Logic 1	A plus A (Note 1)
H	H	L	H	A+B'	(A + B) plus A
H	H	H	L	A+B	(A + B') plus A
H	H	H	H	A	A minus 1

The L denotes the logic low and H denotes logic high.

ALU Logic Diagram:



PROCEDURE:

(iv) Connections are given as per circuit diagram.

(v) Logical inputs are given as per circuit diagram.

(vi) Observe the output and verify the truth table.

OBSERVATION TABLE:

A_0	A_1	A_2	A_3	B_0	B_1	B_2	B_3	C_n	S_0	S_1	S_2	S_3	F_0	F_1	F_2	F_3	M