Objective:

To design the adder-subtractor composite circuit.

Theory:

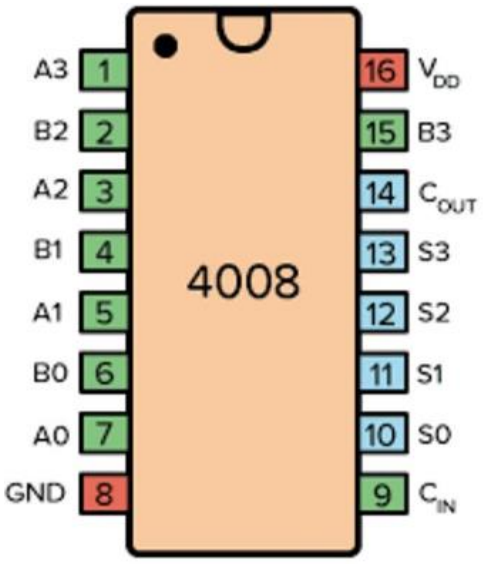
The 4-bit adder-subtractor composite circuit performs the operation of both addition and subtraction. It has two 4-bits inputs $A_3A_2A_1A_0$ and $B_3B_2B_1B_0$. The Mode Select line(M) is connected with the C_{in} of the least significant bit of the Full-adder, is used to perform the operation of addition and subtraction. The XOR gates are used as controlled inverter.

Adders are part of the arithmetic and logic unit (ALU).

Component Required:

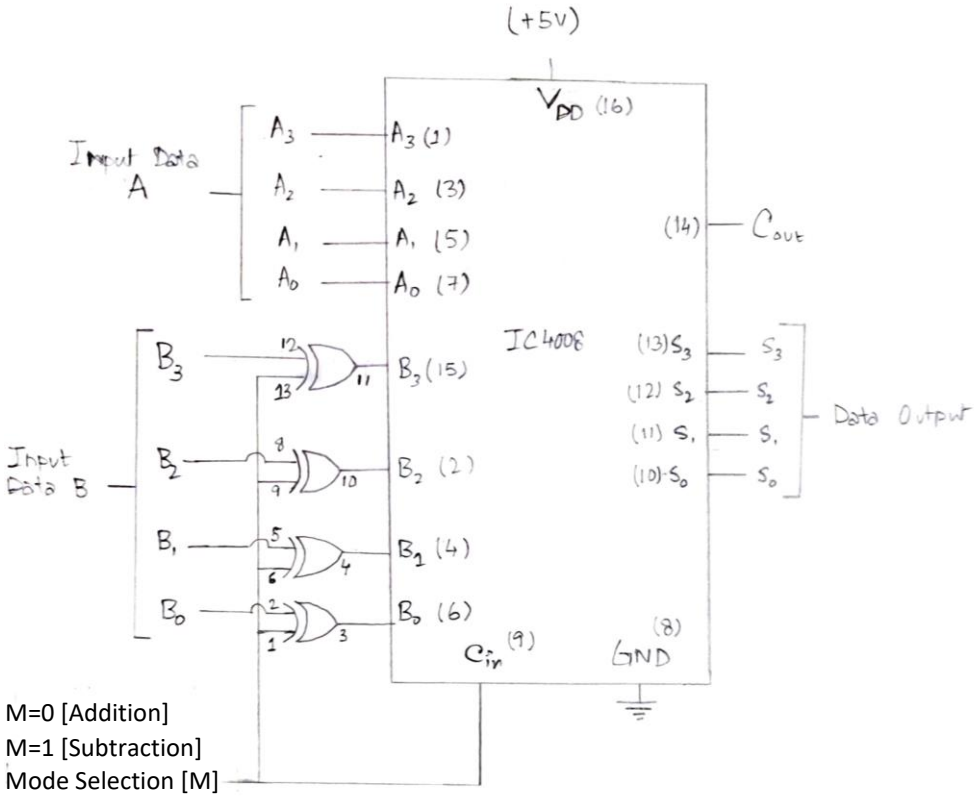
Sl No.	Item	Specification	Qty.
1	IC 4008	4-bit binary full adder	1
2	IC 4070	XOR Gate	1
3	Digital Trainer Kit	-	1
4	Breadboard	-	1
5	Wires	-	-

Pin Diagram:



Pin Diagram of 4-bit Binary Full Adder (IC4008)

Circuit Diagram:



Adder-subtractor composite circuit

Truth Table:

Mode Selection	Input (A)				Input (B)				Output (S)				
	A_3	A_2	A_1	A_0	B_3	B_2	B_1	B_0	C_{out}	S_3	S_2	S_1	S_0
0	0	0	1	0	0	0	1	0	0	0	1	0	0
0	1	0	1	0	1	0	1	0	1	0	1	0	0
0	1	1	0	0	0	0	1	1	0	1	1	1	1
1	1	1	0	0	0	0	1	1	0	1	0	0	1
1	1	0	1	0	0	0	0	1	0	1	0	0	1
1	1	0	0	1	0	0	1	1	0	0	1	0	1

Conclusion:

4-bit adder and subtractor composite circuit was made and truth table was verified.