Experiment-6

★ **Aim :-** To study the operation of Half Subtractor

★ **Apparatus :-** Connecting wires, power supply, IC 7408, IC 7486, IC 7404, LED Display, breadboard.

★ **Theory :-** The half subtractor is a combinational circuit which is used to perform the subtraction of two bits. It has inputs x and y and two outputs 'D' difference and 'B_{out}' borrow out from the truth table. It is clear that the difference output is 0 if $x = y$ and output is 1 if $x \neq y$. The borrow is one whenever $x < y$

★ **Procedure :-**

1. Connect the IC's on the breaboard as per the circuit diagram.
2. Give +5 V to pin 14 and ground at pin
3. Connect input pins A and B of IC from the binary switch.
4. Connect the output pins D and Bout of an IC from LED.
5. Switch off the power supply and change the combination of A and B and observe the output on LED's.
6. Verify the output from truth table.

★ **Result :-** the truth table of Half Subtractor has been verified and its operation has been studied.

★ **Precautions :-**

1. Input and detach the IC carefully from the breadboard without damaging the pins.

Teacher's Signature _____

Date _____

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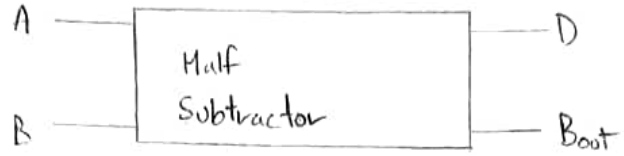
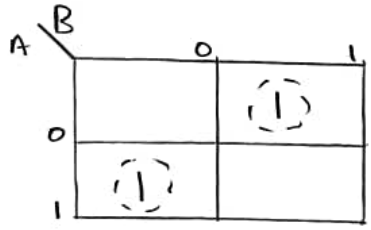
2. Take care while supplying voltage to an IC
3. Connecting of IC's should be strictly according to diagram.



★ Truth table

A	B	D	Bout
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

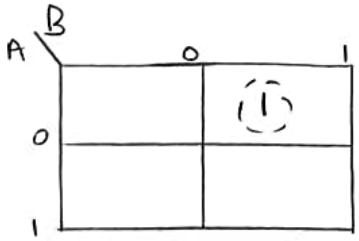
★ K-Map for D (Difference)



$D = \bar{A}B + A\bar{B}$

$= A \oplus B$

★ K-Map for B_{out} (Borrow out)



$B_{out} = \bar{A}B$

★ Circuit Diagram for Half Subtractor