

EXPERIMENT No. 3

REALIZATION OF HALF SUBTRACTOR AND FULL SUBTRACTOR

AIM: To realize Half Subtractor and full Subtractor.

APPARATUS: Breadboard, IC 7486(XOR), IC 7408 (AND), IC 7404(NOT), IC 7432(OR), LEDs, 5V power supply, connecting wires.

THEORY:

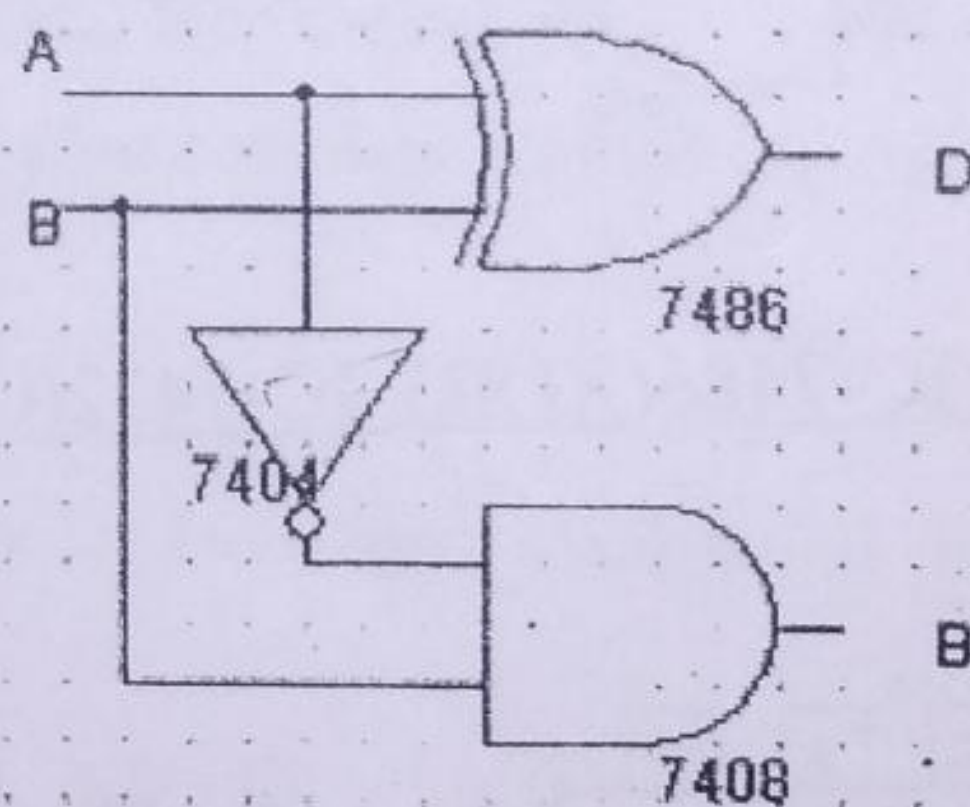
HALF SUBTRACTOR: Subtracting a single-bit binary value B from another A (i.e. A - B) produces a difference bit D and a borrow out bit B-out. This operation is called half subtraction and the circuit to realize it is called a half subtractor. The Boolean functions describing the half-Subtractor are:

$$S = A \oplus B$$

$$C = A' B$$

TRUTH TABLE

INPUTS		OUTPUTS	
A	B	D	Br
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

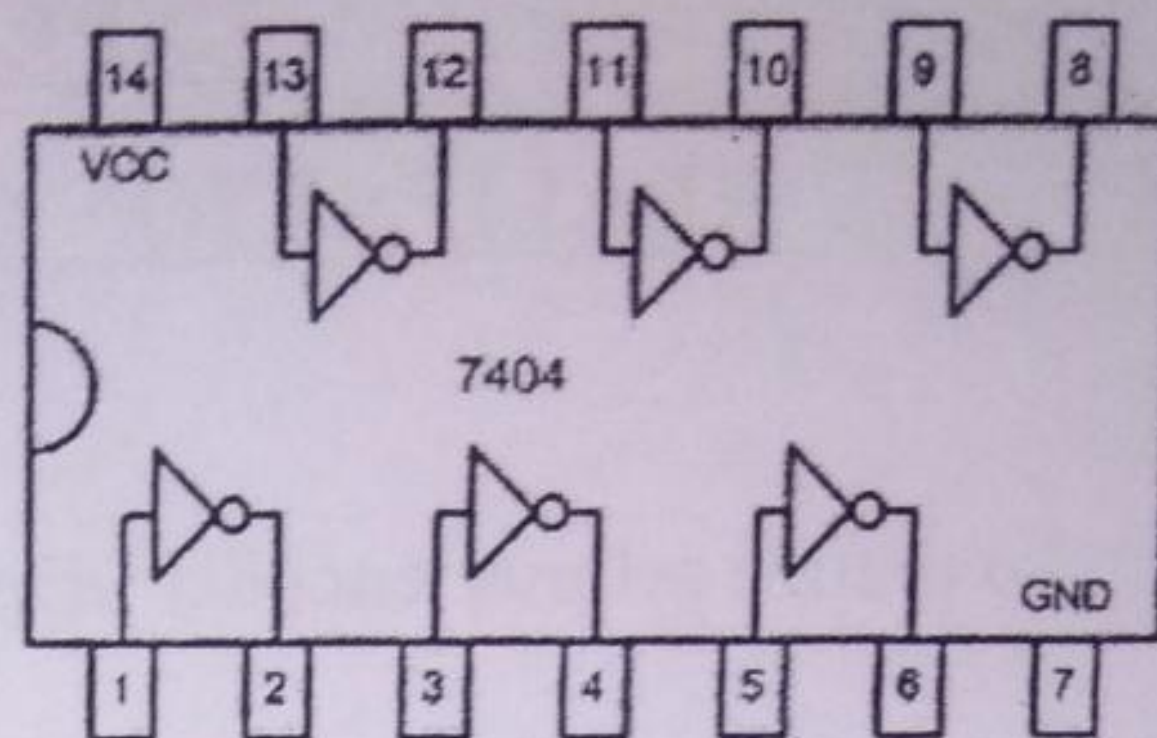
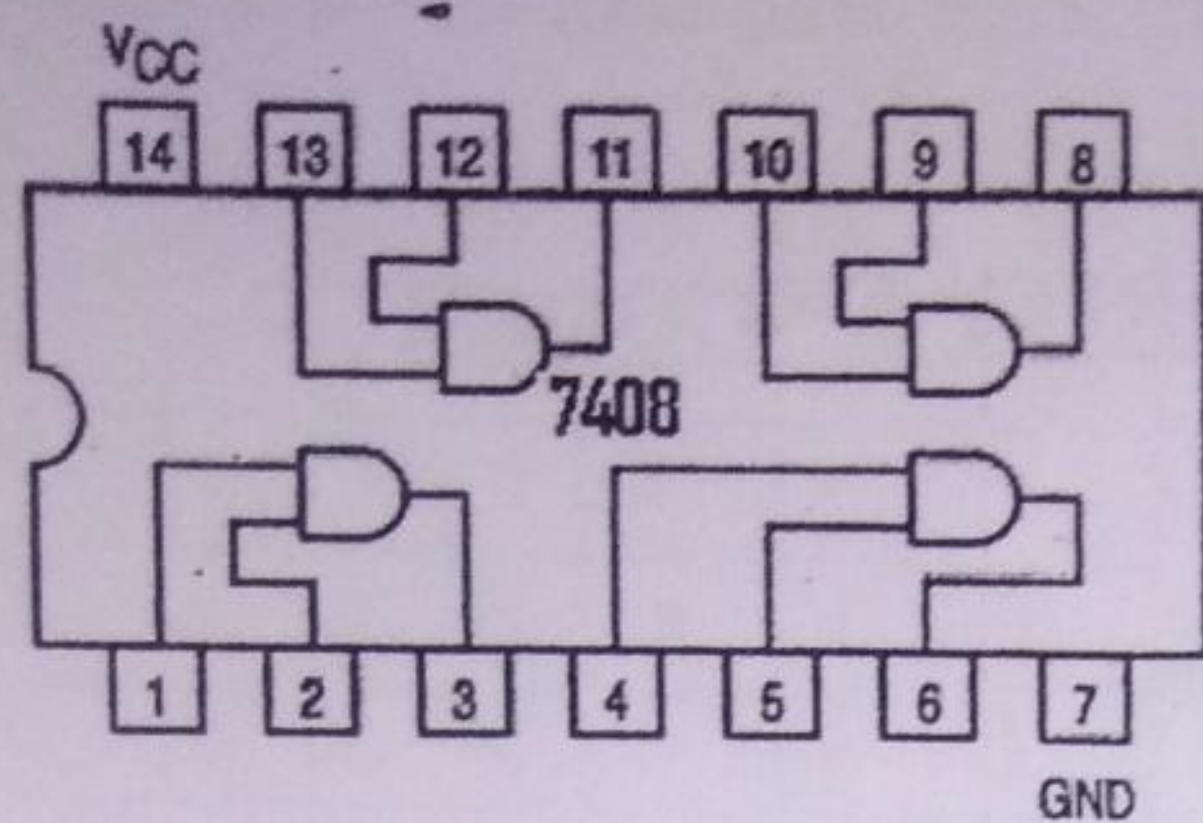


FULL SUBTRACTOR: Subtracting two single-bit binary values, B, Cin from a single-bit value A produces a difference bit D and a borrow out Br bit. This is called full subtraction.

The Boolean functions describing the full-subtractor are:

$$D = (x \oplus y) \oplus \text{Cin}$$

$$\text{Br} = A'B + A'(\text{Cin}) + B(\text{Cin})$$



PROCEDURE:

- Check all the components for their working.
- Insert the appropriate IC into the IC base.
- Make connections as shown in the logic diagram.
- Verify the results and observe the outputs.

PRECAUTIONS:

All ICs should be checked before starting the experiment.

1. All the connection should be tight.
2. Always connect ground first and then the supply.
3. Switch off the power supply after completion of the experiment.

RESULT:

Half Subtractor and Full Subtractor have been studied and their truth table has been verified.

VIVA-VOCE QUESTIONS:

1. Implement half Subtractor with NAND Gate only.
2. Implement half Subtractor with NOR Gate only.
3. Implement Full Subtractor with NAND Gate only.
4. Express Full Subtractor Output in SOP and Pos form.