EXPERIMENT NO.2

AIM: Implementation of the given Boolean function using logic gates in both SOP and POS forms.

APPARATUS REQUIRED:

S.No.	Name of Components	Specifications	Qty.
1	Bread Board	-	01
2	NOT Gate	IC 7404	01
3	AND Gate	IC 7408	01
4	OR Gate	IC 7432	01
5	Connecting Wires	-	As per required

THEORY:

Logical functions are generally expressed in terms of logical variables. Values taken on by the logical functions and logical variables are in the binary form. An arbitrary logic function can be expressed in the following forms:

i) Sum of Products (SOP)

ii) Product of Sums (POS)

Sum of Products (SOP):

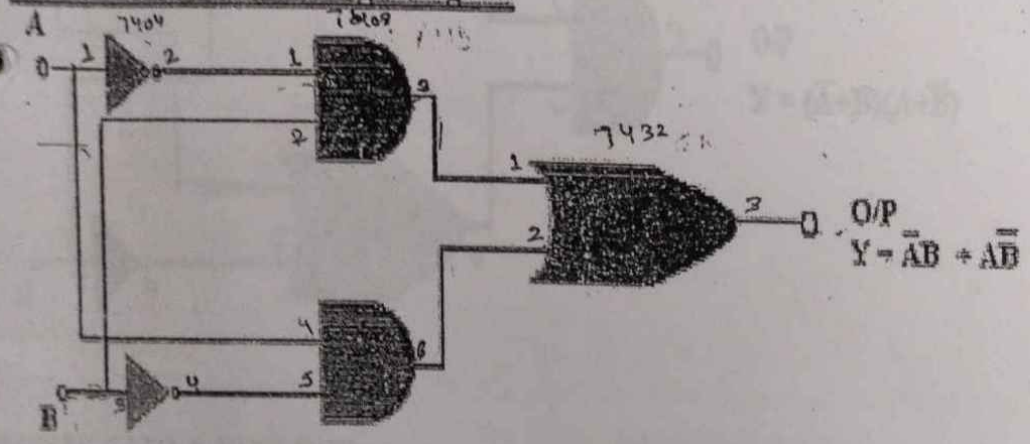
The logic sum of two or more logical product terms is called a Sum of Products Expression. It is basically an OR operation of AND operated variable such as:

$$Y = AB + BC + AC$$

$$Y = AB + \bar{A}C + BC$$

In this approach we simplified the given Boolean expression using basic Boolean laws and theorem. In this approach we assign '1' value to the normal variable and '0' to its complements. Also considered the values to find the expression from any arithmetic or logic calculation.

Sum of Product solution logic diagram



Product of Sums (POS)

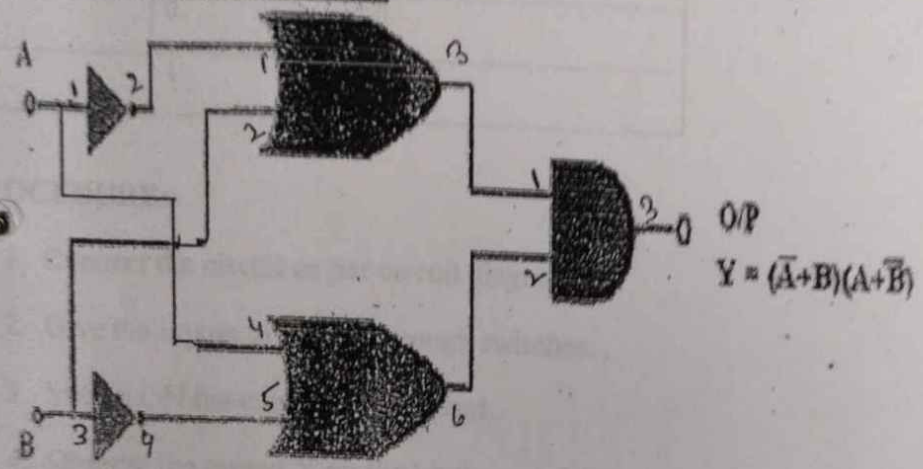
A product of Sums expression is a logical product of two or logical sum terms. It is basically an AND operation of OR operated variables such as:

$$Y = (A + B)(B + C)(C + \bar{A})$$

$$Y = (A + B + C)(A + \bar{C})$$

In POS form we simplified the given Boolean expression using basic Boolean laws and theorem. In this approach we assign '0' values to normal variable and '1' to its complements. Also considered the values to find any arithmetic or logic calculation.

The POS solution logic diagram



TRUTH TABLE FOR SOP:-

INPUT		OUTPUT
A	B	$Y = A\bar{B} + \bar{A}B$
0	0	0
0	1	1
1	0	1
1	1	0

TRUTH TABLE FOR POS:-

INPUT		OUTPUT
A	B	$Y = (A + B)(\bar{A} + B)$
0	0	1
0	1	0
1	0	0
1	1	1

PROCEDURE:-

1. Connect the circuit as per circuit diagram.
2. Give the inputs to A & B through switches.
3. Switch ON the experimental board.
4. Observe the output Y on the kit through LEDs.
5. For different combination of inputs observe the output and match them with respective truth table and verify the equations SOP & POS.

RESULT:

Study of Boolean function and both equations SOP & POS are verified.

PRECAUTIONS:

1. All ICs should be checked before starting the experiment.
2. All the connection should be tight.
3. Always connect ground first and then connect Vcc.
4. Suitable type wire should be used for different types of circuit.
5. The kit should be off before change the connections.
6. After completed the experiments switch off the supply of the apparatus.