Name : Shanafat
ID: 2102024
Reg: 10151

CCE : 223
Digital logic design
(sessional)

Experiment 01

Experiment Title : Implementing circuit with basic gates.

Theory : This lab introduces basic logic gates and ICs. We are trying to implement a basic gate with its simplified form. Our equation is $(A+B)'(A'+B')'$. Here if we are trying to implement it directly we will have to use upto 7 different logic gates like 'not', 'or' and 'and' gate. So we will try to simplify our equation to get a more minimal and optimal approach to solve this circuit. Here,

- Not gate = An inverter, which turns its output into opposite bit.
- And gate = This logical gate outputs 1 only if all inputs are 1.

Apparatus: Bread board, jumper cables, power supply (5V), 74LS05, 74LS08, LED.

Boolean function: Our equation is,

$$(A+B)'\,(A'+B')'$$

We can simplify it like

$$(A'.B')(AB)$$

Truth table:

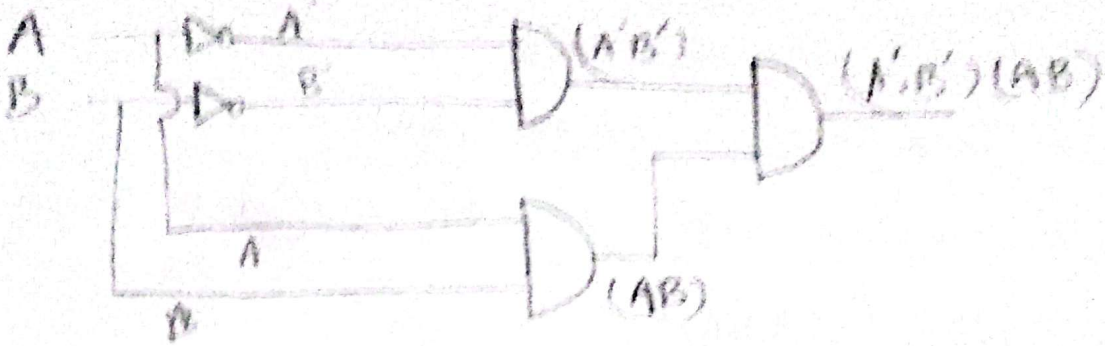
A	B	A′	B′	(A+B)	(A+B)′	(A′+B′)	(A′+B′)′	(A+B)′(A′+B′)′
0	0	1	1	0	1	1	0	0
0	1	1	0	1	0	1	0	0
1	0	0	1	1	0	1	0	0
1	1	0	0	1	0	0	1	0

If we use the equation $(A'.B')(AB)$, our truth table will be,

A	B	A′	B′	(A′.B′)	AB	(A′.B′)(AB)
0	0	1	1	1	0	0
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	1	0	0	0	1	0

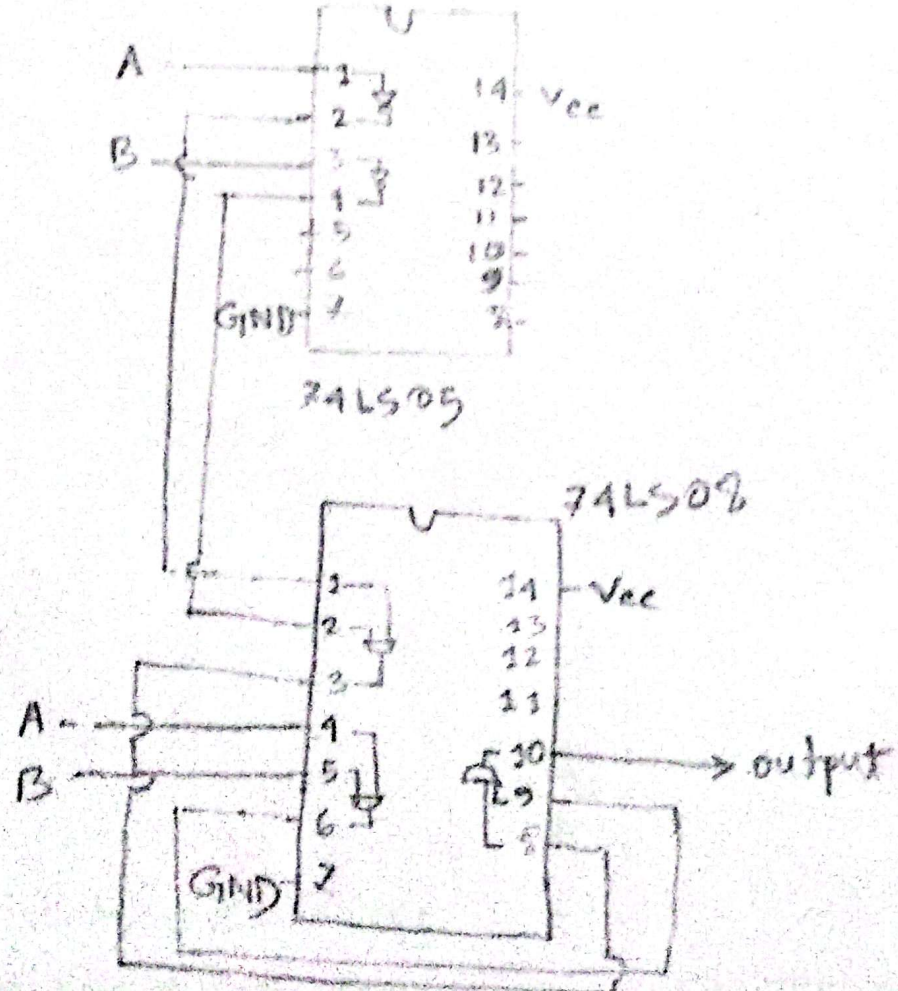
Hence we can say we will get exactly the same result with our simplified form.

Logic diagram:



Here, two inverter and three and gates are used to get the final output.

Pin diagram:



Output : Here after constructing the circuit and testing it with different values, we can conclude that it exactly matches with our truth table. So we can say our circuit with its simplified form gets the actual output