JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

.....Electronics... Engg. Laboratory

Name.....TATHAGATA SUR.....

Class ..CSE-UG1.. Sec.....A1..... Roll No..002310501036

Date of Experiment...22/01/24..... Date of Submission...29/01/24.....

Marks Obtained..... Signature of Examiner.....

NAME	CO-WORKER	ROLL
	Shyam Sundar Karmakar	002310501025
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Experiment No.....04-A.....

Commence at.....11:00 AM.....

Completed at.....2:00 PM.....

Name of Teacher concerned

TITLE : Truth table of basic logic gates and NAND gate as a Universal Logic gate

OBJECT : To study T-Tb of basic gates and NAND gate as Universal gate

Apparatus used:-

(i) IC - 7400 (ii) Regulated DC power supply
(iii) Bread board (iv) LED (v) Resistor

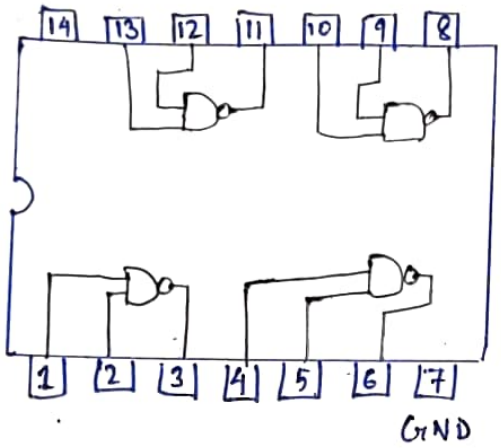
IC - 7400:

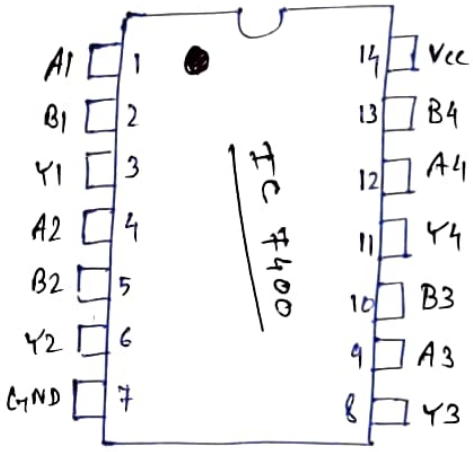
The series of transistor logic IC are now very power and are quickly replacing diode transistor Logic. It has 14 pairs and 4 inbuilt NAND gates.

Input pairs:- 1 & 2, 4 & 5, 9 & 10, 12 & 13

Output pairs:- 3, 6, 8, 11

Pin 7 is earthed and 14 is connected to voltage source.

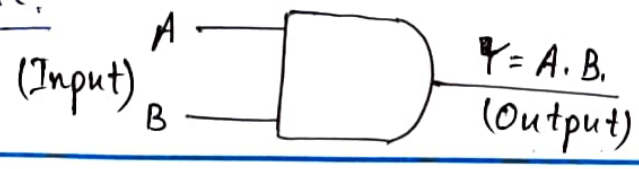




Universal gate:-

NAND and NOR gates are called universal gates as they can be used to construct any Boolean function without using any other gate. They are economical to fabricate into circuits.

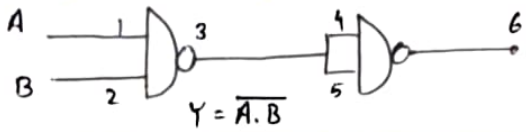
AND gate:-



Truth Table:-

SL No.	A	B	Y = A.B
1)	0	0	0
2)	0	1	0
3)	1	0	0
4)	1	1	1

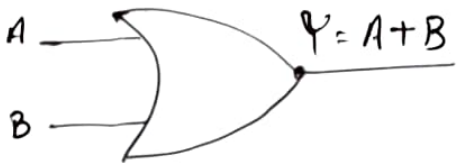
Using NAND gate:-



$Y = \overline{(\overline{A.B})} = A \cdot B$

SL. NO.	A	B	$\overline{A.B}$	$\overline{\overline{A.B}} = A.B$
1)	0	0	1	0
2)	0	1	1	0
3)	1	0	1	0
4)	1	1	0	1

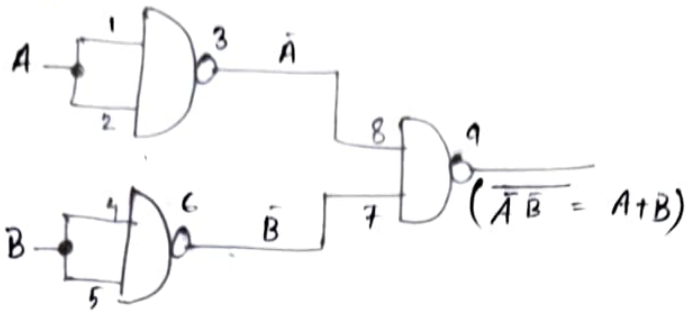
OR gate:-



Truth Table:-

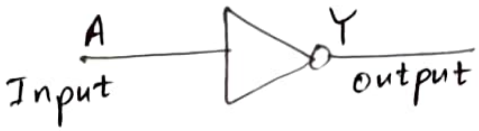
SL.NO.	A	B	Y = A + B
1)	0	0	0
2)	0	1	1
3)	1	0	1
4)	1	1	1

Using NAND gate:-



Sl.No.	A	B	$\bar{A}$	$\bar{B}$	$\bar{A}.\bar{B} = A+B$
1)	0	0	1	1	0
2)	0	1	1	0	1
3)	1	0	0	1	1
4)	1	1	0	0	1

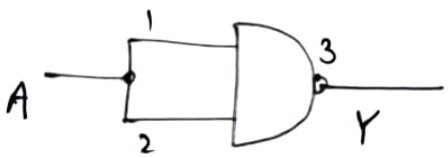
NOT gate:-



Truth Table:-

Sl.No.	A	$Y = \bar{A}$
1)	0	1
2)	1	0

Using NAND gate:-



Observations:

1) For 1, we take inputs in pin (1,2), (4,5), (9,10), (12,13) and outputs from 3, 6, 8, 11 respectively. The LED bulb glows for all order of high and Low inputs except when both inputs are of high voltage.

2) For 2, we take (1,2) as input and 3 as output. We then connect output to (4,5) input pins and take output Y from 6. We see that the bulb glows only when both inputs are high pass, thus it is equivalent to AND gate.

3) For 3, we take (1,2) and (4,5) as input pins, and 3,7 as their respective outputs are used as inputs for (9,10), giving resultant output Y through 8. It is observed that LED stops glowing only for both Low inputs, hence equivalent to OR gate

4) For 4, we take either a high pass or a Low pass input for this case, and observe that we get the opposite pass of the input; hence equivalent to NOT gate.

Precautions:-

(i) All pins must be correctly identified from I.C.
(ii) All connections on bread board must be properly made
(iii) The Vcc of 5V should not cross limit
(iv) All wires must be properly insulated.