INDEX

Name of student………………………Class/ Batch…………… Roll No. ………

Course/Branch………………… Session…………………. Semester………

Name of subject…………………….. Subject Code……………

S. No.	Experiment	Date of Perform	Date of Submission	Grading scale(10)	Signature
1					
2					
3					
4					
5					
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7					
8					
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10					

EXPERIMENT NO. 1

OBJECTIVE: Breadboard implementation of different (AND, OR, NOT, NAND, NOR, EX-OR) logic gates.

APPARATUS AND MATERIAL REQUIRED:

S No.	COMPONENT	SPECIFICATION	QTY.
1.	AND GATE	IC 7408	1
2.	X-OR GATE	IC 7486	1
4.	OR GATE	IC 7432	1
5.	NOT GATE	IC 7404	1
6.	NAND GATE	IC 7400	1
7.	NOR GATE	IC 7402	1
8.	POWER SUPPLY +5V	-	1
9.	BREAD BOARD	-	1
10.	LED	-	ADEQUATE
11.	CONNECTING WIRE	-	ADEQUATE

THEORY:

AND GATE- The AND gate is a basic digital logic gate that performs logical multiplication. A HIGH output (1) results only if all the inputs to the AND gate are HIGH (1). If none or not all inputs to the AND gate are HIGH, LOW output results. The function can be extended to any number of inputs.

Symbol

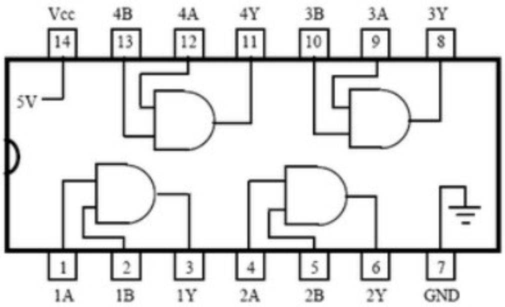
Q= A.B

Truth table

Input		Output
A	**B**	**Q**
0	**0**	**0**
0	**1**	**0**
1	**0**	**0**
1	**1**	**1**

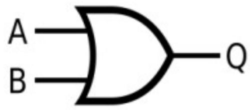
Pin diagram

IC 7408



OR GATE- The **OR gate** is a digital logic gate that performs logical addition. A HIGH output (1) results if one or both the inputs to the gate are HIGH (1). If neither input is high, a LOW output (0) results.

Symbol

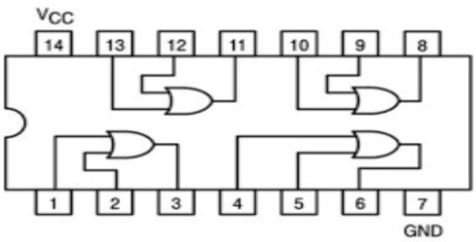


Q=A+B

Truth Table

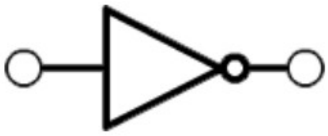
Input		Output
A	**B**	**Q**
0	**0**	**0**
0	**1**	**1**
1	**0**	**1**
1	**1**	**1**

Pin diagram
IC 7432



NOT GATE- NOT gate, often called an *inverter*, is a nice digital logic gate to start with because it has only a single input with simple behavior. A NOT gate performs *logical negation* on its input. In other words, if the input is true, then the output will be false. Similarly, a false input results in a true output.

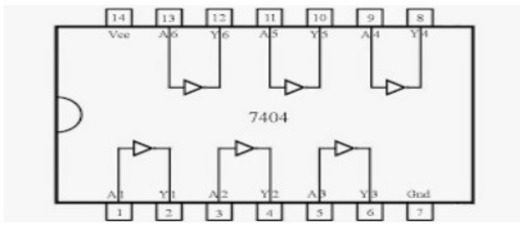
Symbol



Truth table

Input	Output
A	**Q**
0	**0**
0	**1**

Pin diagram



Similarly write yourself for (NAND GATE, NOR GATE, EX-OR GATE with Symbol, Truth table, Pin diagram)

PROCEEDURE:

(i) Connections are given for respective IC.
(ii) Observe the output and verify the truth table.

PRECAUTIONS:

1. Switch off the power supply while making connections.
2. All the connections should be made properly as per the circuit diagram.
3. Get your circuit checked, either by faculty or by lab assistant before you switch on the power supply.

RESULT: The different logic gates are implemented and verified using breadboard.

EXPERIMENT NO. 2

OBJECTIVE: To design and construct half adder, full adder circuits and verify the truth table using logic gates.

APPARATUS AND MATERIAL REQUIRED:

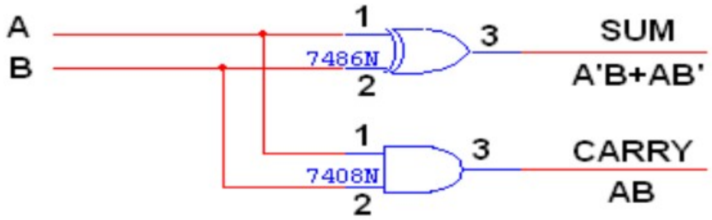
S No.	COMPONENT	SPECIFICATION	QTY.
1.	AND GATE	IC 7408	1
2.	X-OR GATE	IC 7486	1
4.	OR GATE	IC 7432	1
4.	POWER SUPPLY +5V	-	1
5.	BREAD BOARD	-	1
6	LED	-	ADEQUATE
7	CONNECTING WIRE	-	ADEQUATE

THEORY:

HALF ADDER:

A half adder has two inputs for the two bits to be added and two outputs one from the sum ' S' and other from the carry ' c' into the higher adder position. Above circuit is called as a carry signal from the addition of the less significant bits sum from the X-OR Gate the carry out from the AND gate.

LOGIC DIAGRAM:



TRUTH TABLE:

A	B	CARRY	SUM

0 0 1 1	0 1 0 1	0 0 0 1	0 1 1 0

K-Map for SUM:

A \ B	00	01
00		1
01	1	

SUM = A'B + AB'

K-Map for CARRY:

A \ B	00	01
00		
01		1

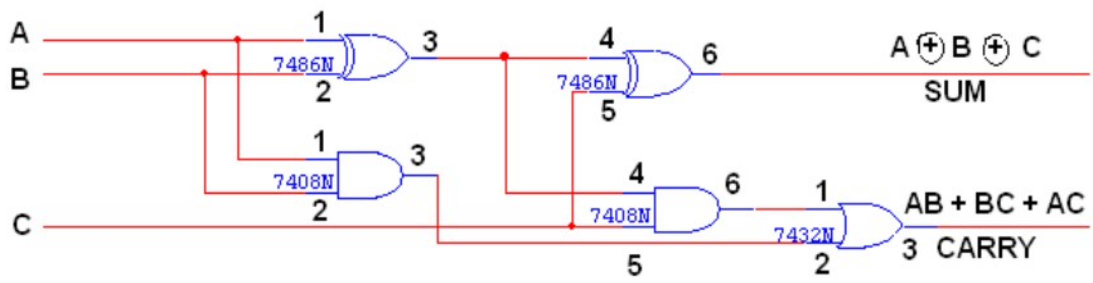
CARRY = AB

FULL ADDER:

A full adder is a combinational circuit that forms the arithmetic sum of input; it consists of three inputs and two outputs. A full adder is useful to add three bits at a time but a half adder cannot do so. In full adder sum output will be taken from X-OR Gate, carry output will be taken from OR Gate.

LOGIC DIAGRAM:

FULL ADDER USING TWO HALF ADDER



TRUTH TABLE:

A	B	C	CARRY	SUM

0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

K-Map for SUM:

A \ BC	00	01	11	10
0		1		1
1	1		1	

SUM = A'B'C + A'BC' + ABC' + ABC

K-Map for CARRY:

A \ BC	00	01	11	10
0			1	
1		1	1	1

CARRY = AB + BC + AC

PROCEEDURE:

(iii) Connections are given as per circuit diagram.
(iv) Logical inputs are given as per circuit diagram.
(v) Observe the output and verify the truth table.

PRECAUTIONS:

4. Switch off the power supply while making connections.
5. All the connections should be made properly as per the circuit diagram.
6. Get your circuit checked, either by faculty or by lab assistant before you switch on the power supply.

RESULT: Half adder and Full adder circuits are implemented and verified.

QUESTIONS:

Q1. What are the applications of adders?
Q2. Realize a full adder using two half adders.