EXPERIMENT NO.1

AIM: Introduction to digital electronics lab- nomenclature of digital ICs,

specifications, study of the datasheet, concept of Vcc and ground, verification of
the truth tables of logic gates using TTL ICs.

APPARATUS REQUIRED:

No.	Name of Apparatus	Specifications	Qty.
1	7400	TTL NAND Gate	01
4	7408	TTL AND Gate	01
3	7432	TTL OR gate	01
4	7402	TTL NOR Gate	01
5	7404	TTL NOT Gate	01
6	7486	TTL X-OR Gate	01
7	Digital Trainer kit	With Bread board & 5V dc Supply	01
8	Patch Cords		As required

THEORY:

IC Family Summary: - Various families of logic ICs exist on the market however the families. Mainly used in digital electronics lab are the TTL and the high speed CMOS families.

Vcc: - It is supply voltage which operates any instrument without damaged. Vcc terminal is always Red.

Ground: - It is zero potential point, GND terminal is always black.

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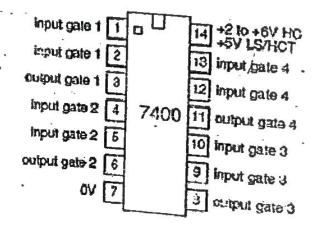
Logic Diagram and Truth Tables for various logic gates:

GATE	DESCRIPTION	TRI	UTH	TABLE
AND GATE	The AND gate is a logic gate that gives an	A	В	X = A . B
A	output of '1' only when	0	0	0
-x = AB	all of its inputs are '1'. Thus it is '0' whenever	0	1	0
AND gate	at least one of its input	1	0	0
	is '0'. Mathematically x = A.B	1	1	1
OR GATE	The OR gate is a logic gate that gives an	A	В	X = A + B
A - X=A+B-	output of '0' only when	0	0	0
8.	all of its inputs are '0'. Thus it is '1' whenever	0	1	1 .
OR Gate -	at least one of its input is '1'. Mathematically x	1	0	1
	= A+B	1	1	1
NOT GATE	The OR gate is a logic gate that gives an output that is opposite	A :	x =	Ā
	the state of its input.	1	0	-
NAND GATE	The NAND gate is and? AND gate with a NOT	A	В	$x = \overline{A.B}$
A TO A TO	gate at its end. Thus for the same combinations	0	0	1
89	of the inputs, the output	0	1	1
	of the NAND gate will be opposite that of an	1	0	1
	AND gate.	1	1	0

NOR GATE	The NOR gate is and OR gate with a NOT gate at its end. Thus for the same combinations of the inputs, the output of the NOR gate will be opposite that of an OR gate.	0 0 1		B 0	0	1 + 8	7
DR GATE	The Exclusive OR gate is a logic gate that gives an output of '1' when only one of the input is '1'.	A 0 0 1 1 1	B 0 1 0 1 1	1 1 0	$0 = A\bar{E}$	3 + AB	

Useful IC Pin details

7400(NAND)



7402(NOR)

output gate 1	1	ا ا	14 +2 to +6V HCT +5V LS/HCT
input gate 1	2		13 output gate 4
input gate t	3	7402	12 Input gate 4
onibrit date 5	4		11 Inpul gate 4
input gate 2	5		10 output gate 3
input gate 2	6		9 input gate 3
OV	7		8 Input gate 3

7404(NOT)

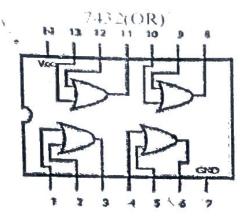
innel nata 1			+2 to +8/1 HU
input gate 1		14	+2 to +6V HC +5V LS/HCT
output gaté 1	2	13	input gate 6
Input gate 2	3	12	oulput gate 6
oulput gate 2	4 74	04 11	input gate 5
input gate 3	5.	10	output gate 5
Categ tuquo	6	9	input gate 4/
OV	7	8	output gate 4

7408(AND)

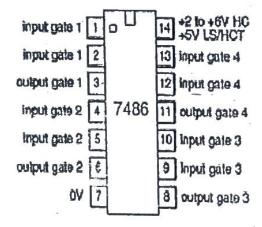
input gate 1	10	14 +2 to +6V HO +5V LS/HCT
/input gate 1	2	13 input gate 4
output gate 1	3	12 input gate 4
input gate 2	4 7408	11 output gate 4
input gate 2	5	10 input gate a
oulput gate 2	6	9 input gate 3
ον [7	8 output gate 3

741 H(3-i/p AND)

input gate 1	1	n U	14 +2 to +6V HO +6V LS/HGT
Input gate t	2		13 Input gate 1
input gate 2	3	2000 000 VO VO	12 output gate 1
Input gate 2	4	7411	II Input gate 3 .
Input gate 2	5		10 Input gate 3
output gate 2	6		9 input gate 3
. 07	7		8 output gate 3



7486(EX-OR)



PROCEDURE:

1, OR Gate

- Place the 2 Input OR gate IC 7432 in the bread board.
- Connect pin no.14 to Vcc(+5V) and pin no. 7 to ground.
- Make the connection for gate 1 connect among pin 1,2 and 3.
- Verify the truth table for various combinations of inputs.

2. AND Gate

- Place the 2 Input AND gate IC 7408 on the bread board.
- Repeat step 2 to 4 as given for OR gate.
- Verify the truth table for various combinations of inputs.

3. NOT Gate

- Place NOT gate IC 7404 on the bread board.
- Connect pin no.14 to Vcc(+5V) and pin no. 7 to ground.
- Make the connection for gate 1 connect among pin 1 and 2.
- Verify the truth table for various combinations of inputs.

4. NAND Gate

- Place the 2 Input NAND gate IC 7400 on the bread board.
- Repeat step 2 to 4 as given for OR gate.
- Verify the truth table for various combinations of inputs.

5. NOR Gate

- Place the 2 Input NOR gate IC 7402 on the bread board.
- Repeat step 2 to 3 as given for OR gate.
- Connect the output to pin no. 3.
- Verify the truth table for various combinations of inputs.

6. X-OR Gate

- Place the 2 Input X-OR gate IC 7486 on the bread board.
- Repeat step 2 to 4 as given for OR gate.
- Verify the truth table for various combinations of inputs

RESULT:

Truth tables of logic gates using TTL ICs are successfully verified.

PRECAUTIONS:

- 1. All the ICs should be checked before use the apparatus.
- 2. All LEDs should be checked.
- 3. All connections should be tight.
- 4. Always connect GND first and then connect Vcc.
- 5. Use suitable type Patch cords.
 - 6. The circuit should be off before change the connections.