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DIGITAL LOGIC DESIGN LAB (EET1211)

LAB I: Examine the Operation of Logic Gates

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Marks: 09 **/10**

Remarks:

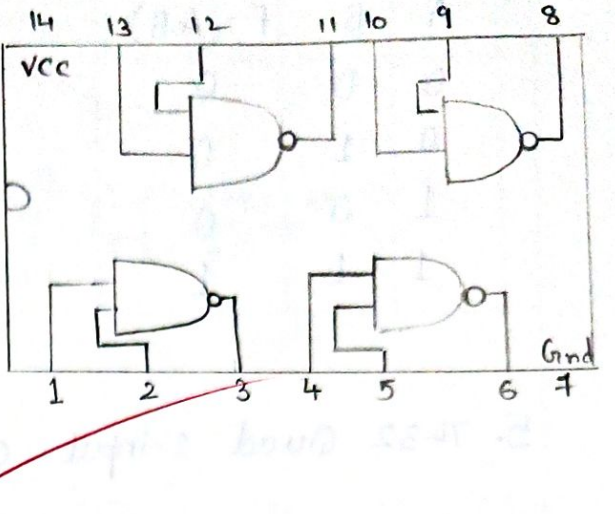
30/10/25

Teacher's Signature

II. PRE-LAB

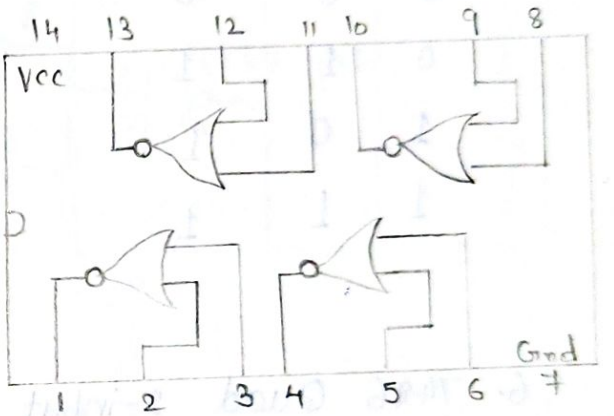
1. 7400 Quad 2-input NAND gate :

A	B	F=(A·B)'
0	0	1
0	1	1
1	0	1
1	1	0



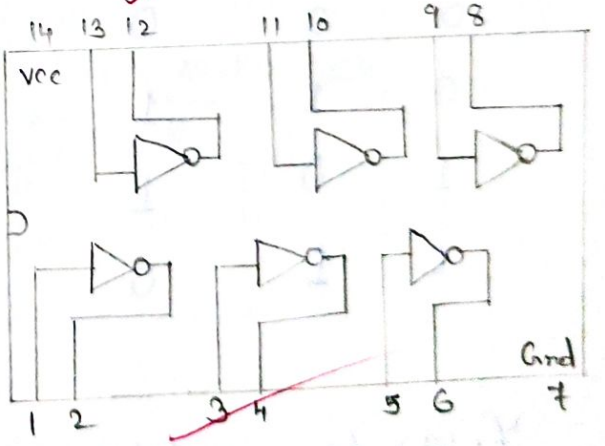
2. 7402 Quad 2-input NOR gates :

A	B	F = (A+B)'
0	0	1
0	1	0
1	0	0
1	1	0



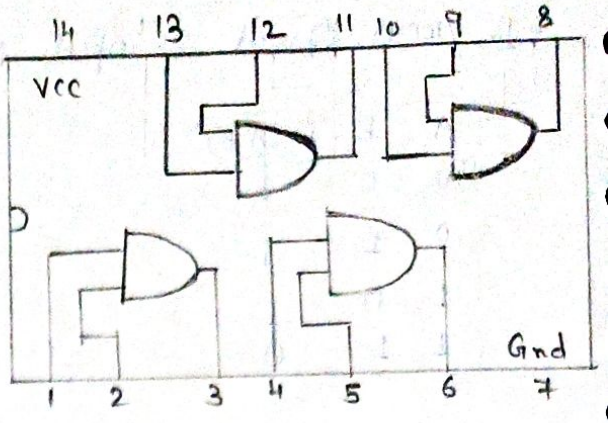
3. 7404 hex inverter :

A	F= A'
0	1
1	0



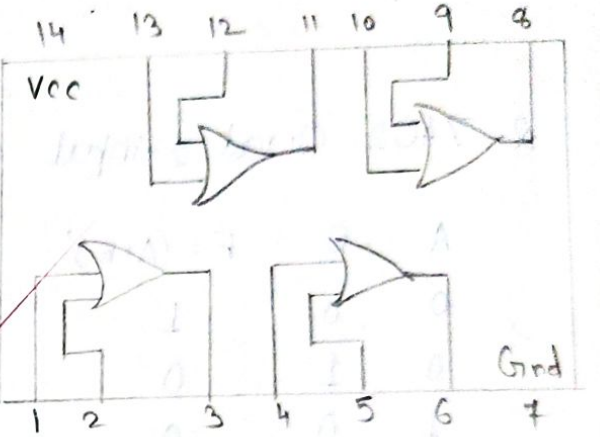
4. 7408 Quad 2-input AND gates:

A	B	F = (A·B)
0	0	0
0	1	0
1	0	0
1	1	1



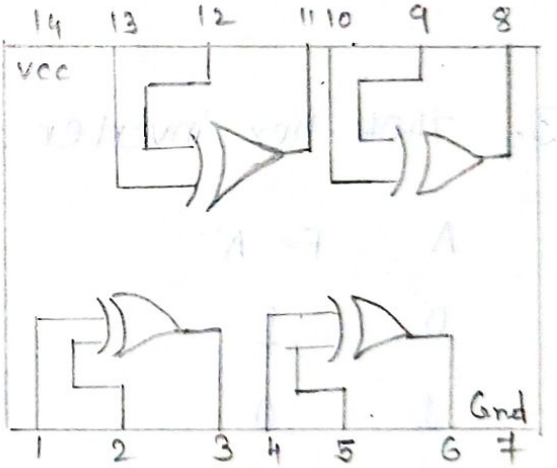
5. 7432 Quad 2-input OR gates:

A	B	F = A+B
0	0	0
0	1	1
1	0	1
1	1	1



6. 7486 Quad 2-input XOR gates:

A	B	F = A ⊕ B
0	0	0
0	1	1
1	0	1
1	1	0



7. (a) An inverter:

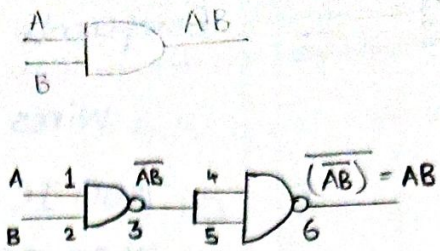
A	A'
0	1
1	0

NOT:

(b) A 2-input AND :

A	B	A·B
0	0	0
0	1	0
1	0	0
1	1	1

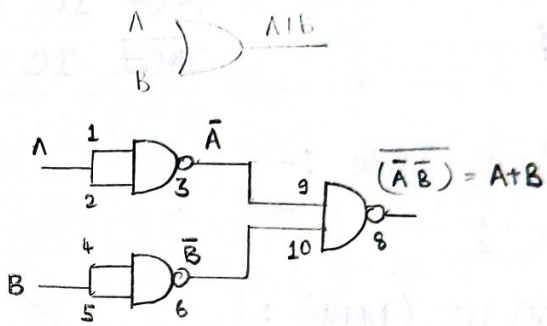
AND :



(c) A 2-input OR :

A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

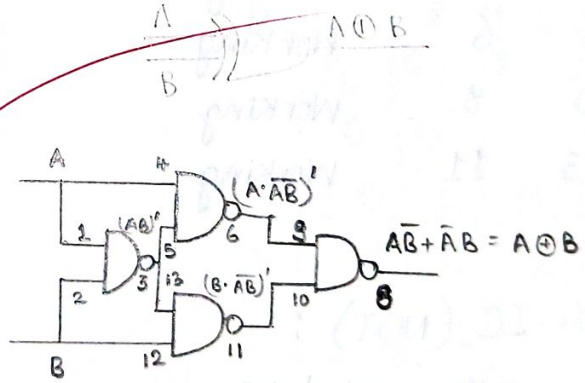
OR :



(d) A 2-input XOR :

A	B	A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

XOR :



III. LAB :

Components Required :-

Objective 2

Sl. No.	Components Name (Description)	Quantity
1	7400 IC (NAND)	1
2	Wires	As required

Objective 1

Sl. No.	Components (Description)	Quantity
1	Wires	As required
2	7400 IC (NAND)	1
3	7432 IC (OR)	1
4	7486 IC (XOR)	1
5	7408 IC (AND)	1
6	7404 IC (NOT)	1
7	7402 IC (NOR)	1

Observation Table :-

Objective 1

(a) 7400 IC (NAND) :

I/P	O/P	Status
1, 2	3	Working
4, 5	6	Working
9, 10	8	Working
12, 13	11	Working

(b) 7402 IC (NOR) :

I/P	O/P	Status
2, 3	1	Working
5, 6	4	Working
8, 9	10	Working
11, 12	13	Working

(c) 7404 IC (NOT) :

I/P	O/P	Status
1	2	Working
3	4	Working
5	6	Working
9	8	Working
11	10	Working
13	12	Working

(d) 7408 IC (AND) :

I/P	O/P	Status
2, 1	3	Working
5, 4	6	Working
10, 9	8	Working
13, 12	11	Working

(e) 7432 IC (OR) :

I/P	O/P	Status
1,2	3	Working
4,5	6	Working
9,10	8	Working
12,13	11	working

(F) 7486 IC (XOR) :

I/P	O/P	Status
1,2	3	Working
4,5	6	Working
9,10	8	Working
12, 13	11	Working

Objective 2

(a) An inverter (NOT) :

A	Y	Status
0	1	Working
1	0	Working

(b) A 2-input AND :

A	B	Y	Status
0	0	0	Working
0	1	0	Working
1	0	0	Working
1	1	1	Working

(c) A 2-input OR :

A	B	Y	Status
0	0	0	Working
0	1	1	Working
1	0	1	Working
1	1	1	Working

(d) A 2-input XOR :

A	B	Y	Status
0	0	0	Working
0	1	1	Working
1	0	1	Working
1	1	0	Working

Conclusion :-

Objective 1

We have concluded that all pins of given ICs are working perfectly.

Objective 2

We have concluded that NAND is a universal gate because we are able to produce an inverter, AND, OR and an XOR gate using one 7400 IC.

IV: POST LAB :

1. What is the voltage range for operation of digital circuits?

→ The voltage range for operation of digital circuits is (0-5) volts.

2. What is the significance of ground and V_{cc} connection?

→ V_{cc} is the power input for a device, it provides the voltage to the circuit generally higher than the ground.

3. Which gates are known as the universal gates & why?

→ NAND & NOR gates are the universal gates because we can construct any gates using this.

4. What is the min^m no. of NAND gates used to realize an XOR gate?

→ Atleast 4 NAND gates are required to realize an XOR gate.

30/1/25