

**DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING  
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603203.**

Title of Experiment	<b>: 10. Verification and interpretation of Logic Gates.</b>
Name of the candidate	:
Register Number	:
Date of Experiment	:

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
<b>Total</b>		<b>50</b>	

**Staff Signature**

**PRE-LAB QUESTIONS**

- 1. Name the different Logic Gates.**
- 2. List out the IC names for the different logic Gates.**
- 3. What is the Boolean expression for a NOR gate?**
- 4. How does a NOR gate work?**
- 5. Expression for Ex-OR and Ex-NOR?**

<b>Experiment No. 10</b> <b>Date :</b>	<b>Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR Exclusive OR (EX-OR), Exclusive NOR (EX-NOR) Gates.</b>
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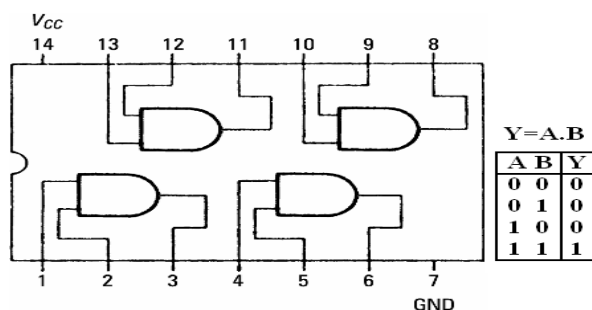
**Aim:** To verify the Boolean expression using logic gates.

**Apparatus:** Logic trainer kit, logic gates / ICs, wires.

**Theory:** Logic gates are electronic circuits which perform logical functions on one or more inputs to produce one output. There are seven logic gates. When all the input combinations of a logic gate are written in a series and their corresponding outputs written along them, then this input/ output combination is called **Truth Table**. The following logic gates and their working are explained.

### i) AND Gate

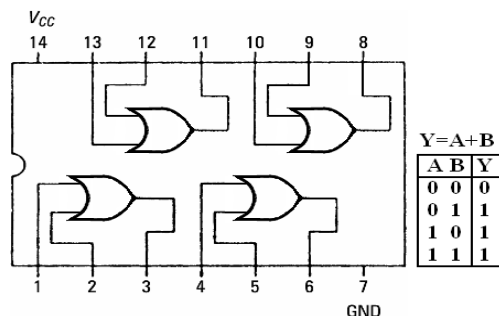
AND gate produces an output as 1, when all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. Its output is 0 when any input is 0.



**IC 7408**

### ii) OR Gate

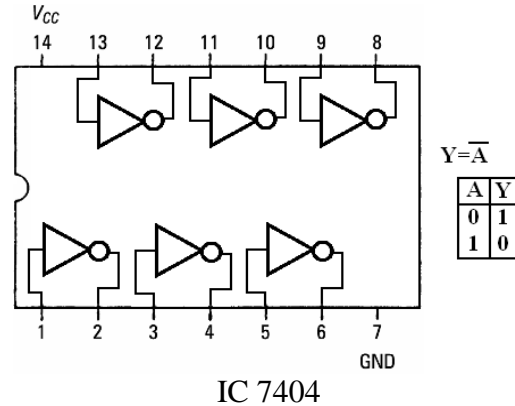
OR gate produces an output as 1, when any or all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. Its output is 0 when all input are 0.



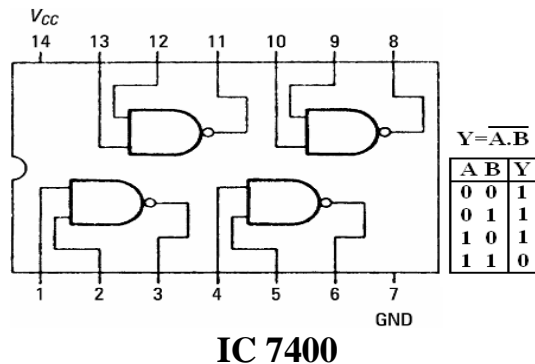
**IC 7432**

**iii) NOT Gate**

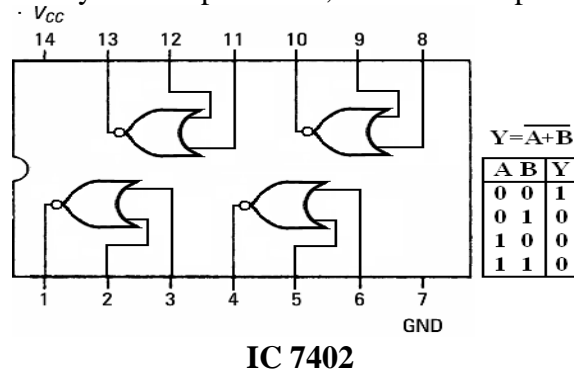
NOT gate produces the complement of its input. This gate is also called an INVERTER. It always has one input and one output. Its output is 0 when input is 1 and output is 1 when input is 0.

**iv) NAND Gate**

NAND gate is actually a series of AND gate with NOT gate. If we connect the output of an AND gate to the input of a NOT gate, this combination will work as NOT-AND or NAND gate. Its output is 1 when any or all inputs are 0, otherwise output is 1.

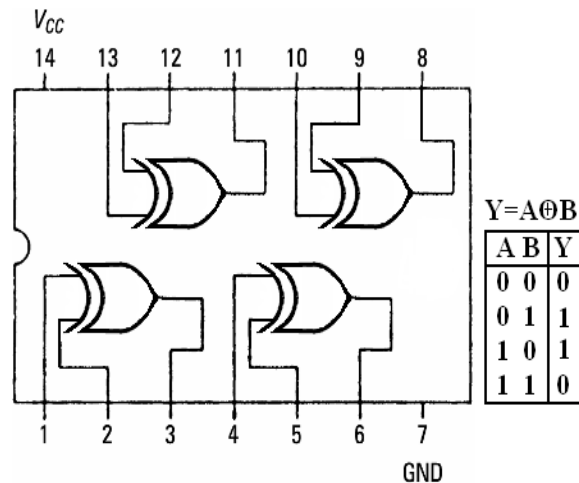
**v) NOR Gate**

NOR gate is actually a series of OR gate with NOT gate. If we connect the output of an OR gate to the input of a NOT gate, this combination will work as NOT-OR or NOR gate. Its output is 0 when any or all inputs are 1, otherwise output is 1.

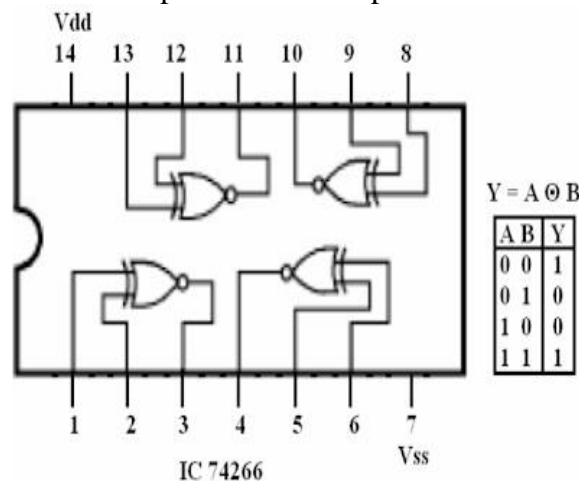


**vi) Exclusive OR (X-OR) Gate**

X-OR gate produces an output as 1, when number of 1's at its inputs is **odd**, otherwise output is 0. It has two inputs and one output.

**IC 7486****vii) Exclusive NOR (X-NOR) Gate**

X-NOR gate produces an output as 1, when number of 1's at its inputs is **not odd**, otherwise output is 0. It has two inputs and one output.

**IC 74266****Procedure:**

1. Connect the trainer kit to ac power supply.
2. Connect the inputs of any one logic gate to the logic sources and its output to the logic indicator.
3. Apply various input combinations and observe output for each one.
4. Verify the truth table for each input/ output combination.
5. Repeat the process for all other logic gates.
6. Switch off the ac power supply.

**POST-LAB QUESTIONS**

- 1. Name the universal Gates?**
  
  
  
  
  
  
  
  
  
  
- 2. Deduce the logic of AND gate using NAND and NOR?**
  
  
  
  
  
  
  
  
  
  
- 3. What is the symbol of NAND gate?**
  
  
  
  
  
  
  
  
  
  
- 4. How many NAND gates are required to make an OR gate?**
  
  
  
  
  
  
  
  
  
  
- 5. How many NOR gates are required to implement a NAND gate?**