



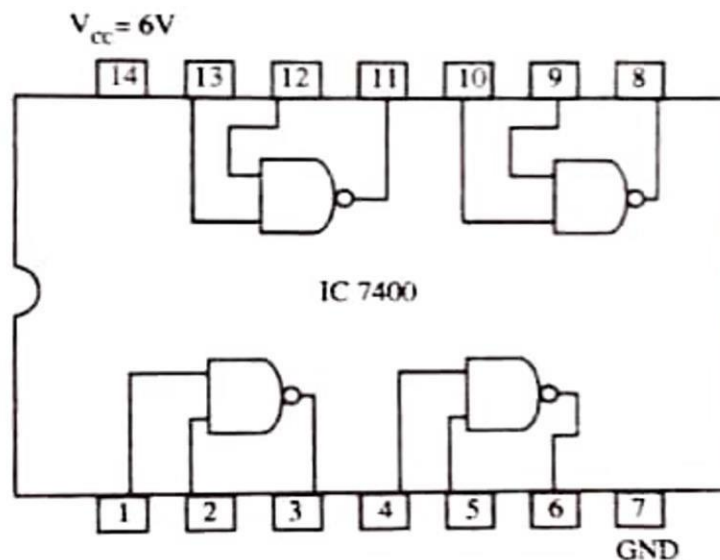
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**MAR THOMA COLLEGE FOR WOMEN, PERUMBAVOOR**

**VERIFICATION OF DE MORGAN'S THEOREMS USING IC 7400**

De Morgan's theorems are fundamental principles in Boolean algebra that describe the relationship between logical operations. These theorems state that the complement of a logical operation is equivalent to the logical operation performed on the complements of its inputs

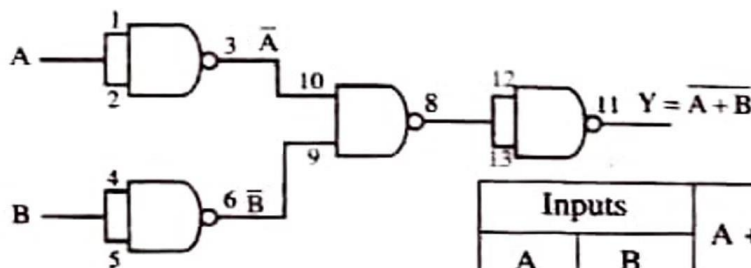
**Aim**

To verify Dr Morgan's theorems using IC 7400



To Prove Law I,  $\overline{A + B} = \overline{A} \cdot \overline{B}$

NOR using NAND gates (L.H.S. of equation)



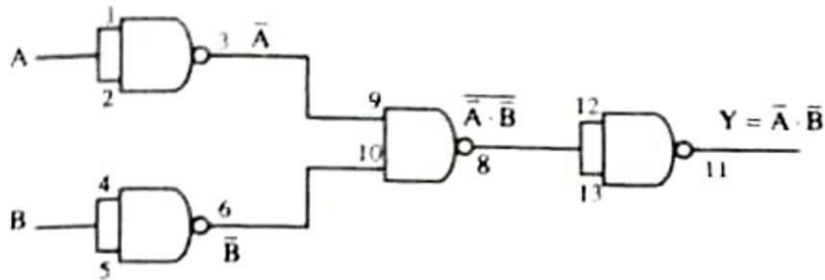
Inputs		A + B	Y = $\overline{A + B}$ Output
A	B		
0	0	0	6V
0	6V	6V	0
6V	0	6V	0
6V	6V	6V	0



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Output is obtained by connecting a voltmeter between pins 11 and 7 through a resistor 1k $\Omega$ .

For R.H.S. of the equation



Inputs		$\bar{A}$	$\bar{B}$	$\bar{A} \cdot \bar{B}$
A	B			
0	0	6V	6V	6V
0	6V	6V	0	0
6V	0	0	6V	0
6V	6V	0	0	0

**Result**

From the above two truth tables I law  $\overline{A + B} = \bar{A} \cdot \bar{B}$  is proved.

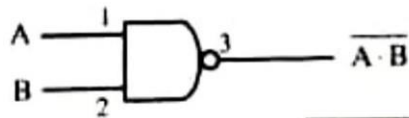


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**Aim**

To Prove law II,  $\overline{A \cdot B} = \overline{A} + \overline{B}$

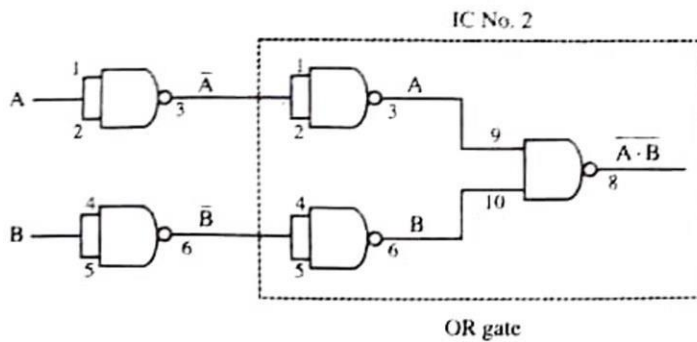
L.H.S.



Inputs		A · B	$\overline{A \cdot B}$
A	B		
0	0	0	6V
0	6V	0	6V
6V	0	0	6V
6V	6V	6V	0

R.H.S.

Here two 7400 ICs are used



OR gate

Truth table for OR

Inputs		$\overline{A}$	$\overline{B}$	$\overline{A} + \overline{B}$	Inputs		A · B	$\overline{A \cdot B}$
A	B				$\overline{A}$	$\overline{B}$		
0	0	6V	6V	6V	6V	0	6V	
0	6V	6V	0	6V	0	0	6V	
6V	0	0	6V	6V	6V	0	6V	
6V	6V	0	0	0	0	6V	0	



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**Result**

From the truth tables II law,  $\overline{\overline{A} + \overline{B}} = \overline{A \cdot B}$

**References**

- Experimental Physics – II, For Fifth & Sixth Semester, BSc Degree Programme, Dr.P. Sethumadhavan, Prof. K.C. Abraham, Prof. Meppayil Narayanan, Prof. Philipson C Philip, **Manjusha Publications**
- <https://youtu.be/6eecDBqaYFY?si=zLrQIRizRNx9fLNd>

