

Logic Design I – Laboratory 05

De Morgan's Theorem

#	Student ID	Student Name	Grade (10)	Instructor signature
1				
2				
3				

Delivery Date	
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Objective

- 1- To study DeMorgan's theory and implemented it.
- 2- Learn how to simplify Boolean logic equations using DeMorgan's theory.

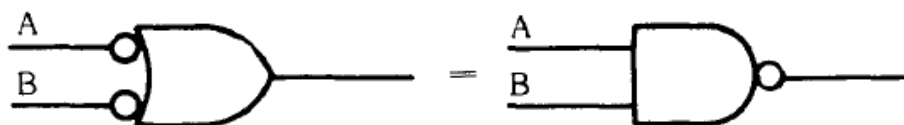
Theory Overview

In simple words, DeMorgan's Theory is used to convert AND/NAND gates to OR/NOR ones, and presented OR/NOR gates by AND/NAND gates by these 2-laws:

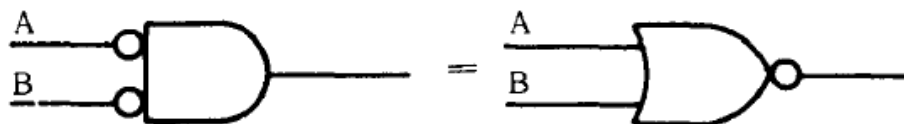
$$(A+B)' = A' \cdot B'$$

$$(A \cdot B)' = A' + B'$$

$$\overline{A+B} = \overline{A} \cdot \overline{B}$$



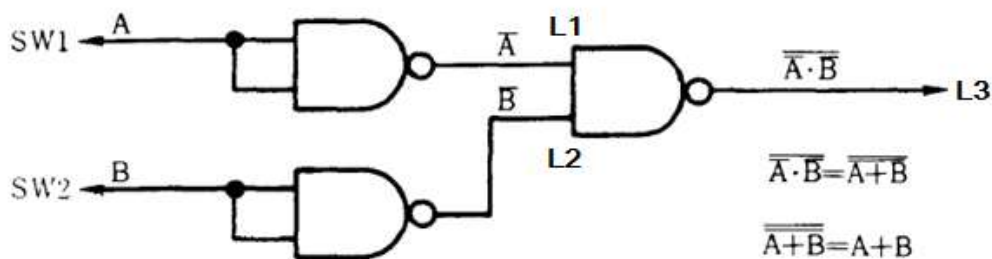
$$\overline{A \cdot B} = \overline{A} + \overline{B}$$



Procedure

Part 1:

Implementing the OR Function using NAND Gates

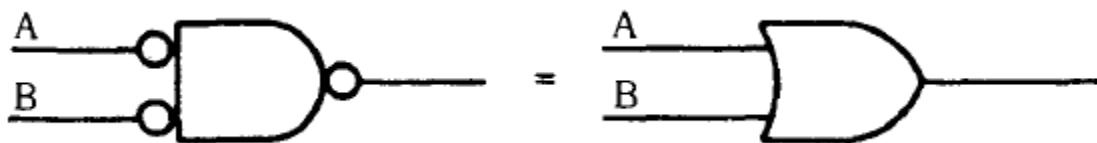


Equivalent Logic Symbol :



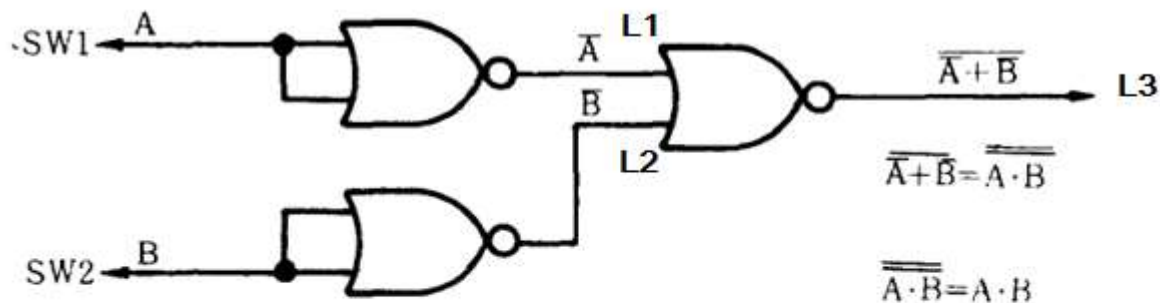
Input1 (SW1)	Input2 (SW2)	Output1 (L1)	Output2 (L2)	Output3 (L3)

Compare the output with the OR gate truth table output.



Input1 (SW1)	Input2 (SW2)	Output1 (L1)

Part 2: Implementing the AND Function using NOR Gates

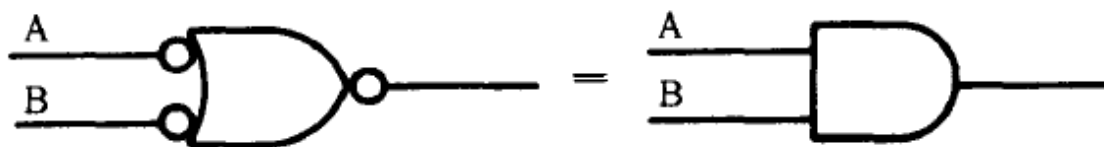


Equivalent Logic Symbol :



Input1 (SW1)	Input2 (SW2)	Output1 (L1)	Output2 (L2)	Output3 (L3)

Compare the output with the And gate truth table output.



Input1 (SW1)	Input2 (SW2)	Output1 (L1)

Original function

A	B	C	L1	L2	L3	L4

A	B	C	L1	L2	L3	L4	L5