

Lab 5

First Stage

Cyber Security Science Department



Computer Organization and Logic Design

Lab 5: The Exclusive-NOR Gate

By

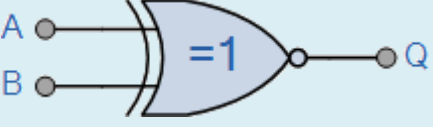
Asst. Lect. Ali Saleem Haleem

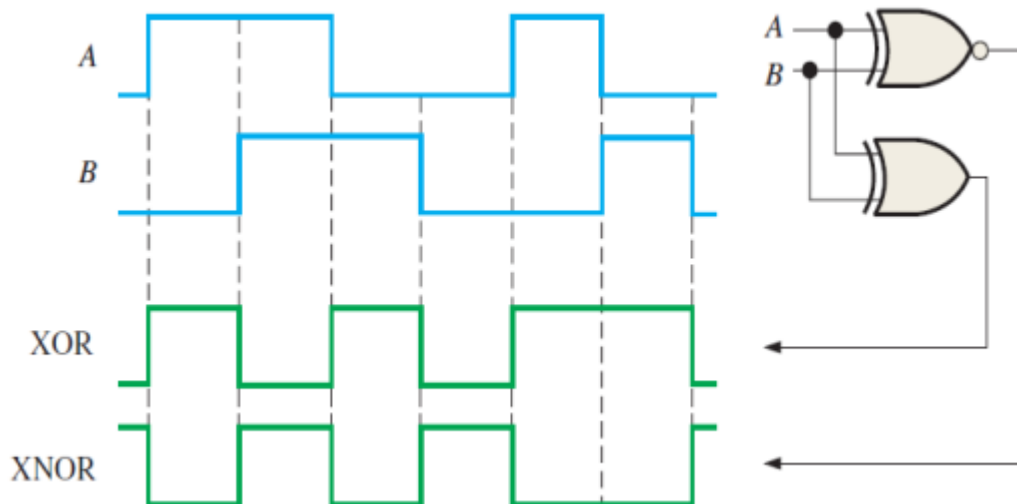
1. The Exclusive-NOR Gate

The Exclusive-NOR gate is equivalent to X-OR gate followed by NOT gate. Standard symbols for an Exclusive-NOR (X-NOR) gate and Boolean expression for the output of a 2-input X-NOR gate can be written as:

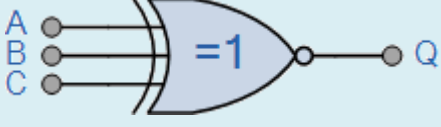
$$Q = \bar{A}\bar{B} + AB = \overline{A \oplus B}$$

2-input X-NOR Gate

Symbol	Truth Table		
 2-input X-NOR Gate	B	A	Q
	0	0	1
	0	1	0
	1	0	0
	1	1	1
Boolean Expression $Q = \overline{A \oplus B}$		Read if A AND B the SAME gives Q	



3-input XNOR Gate

Symbol	Truth Table			
 3-input XNOR Gate	C	B	A	Q
	0	0	0	1
	0	0	1	0
	0	1	0	0
	0	1	1	1
	1	0	0	0
	1	0	1	1
	1	1	0	1

	1	1	1	0
Boolean Expression $Q = \overline{A \oplus B \oplus C}$	Read as “any EVEN number of Inputs” gives Q			

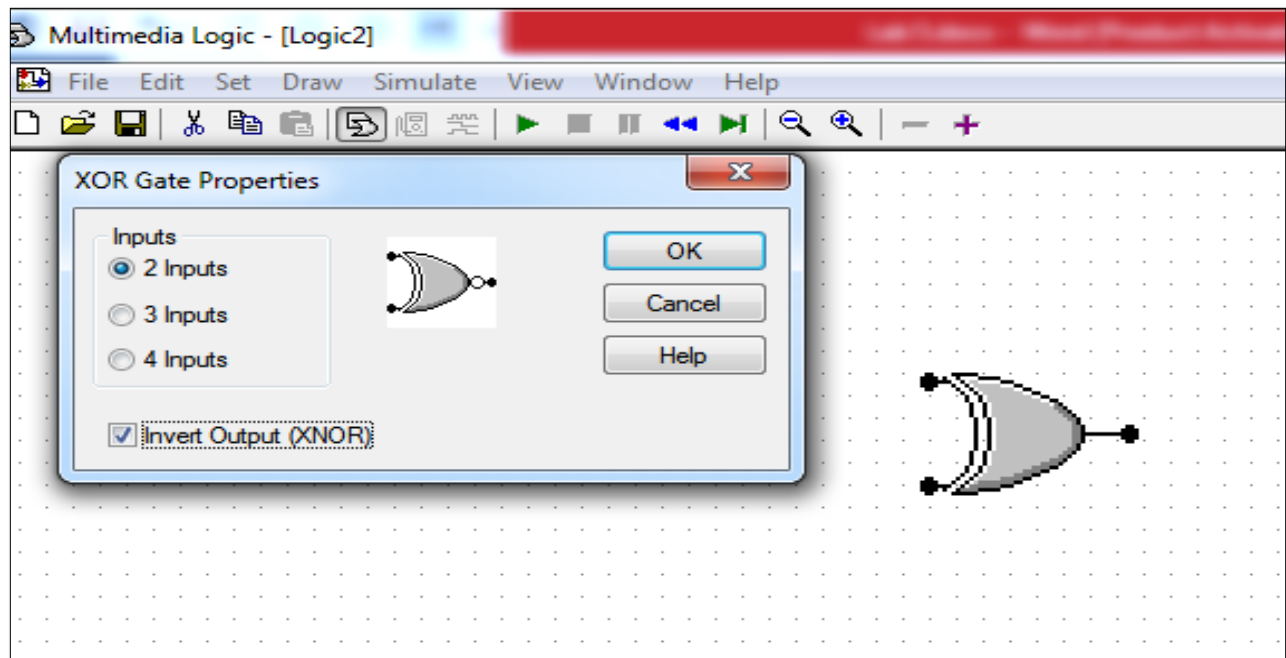
(Homework)

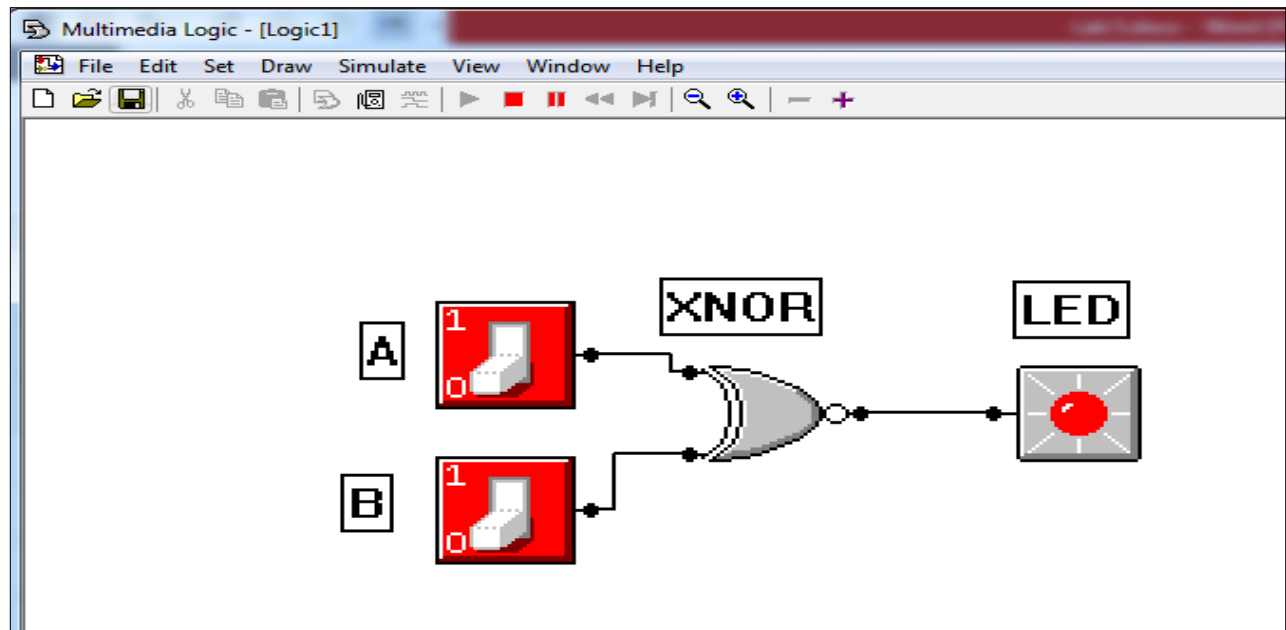
Giving the Boolean expression of:

$$Q = \overline{ABC} + \overline{A \oplus B \oplus C} + A\bar{B}C$$

2. Implementation

2-input XNOR Gate



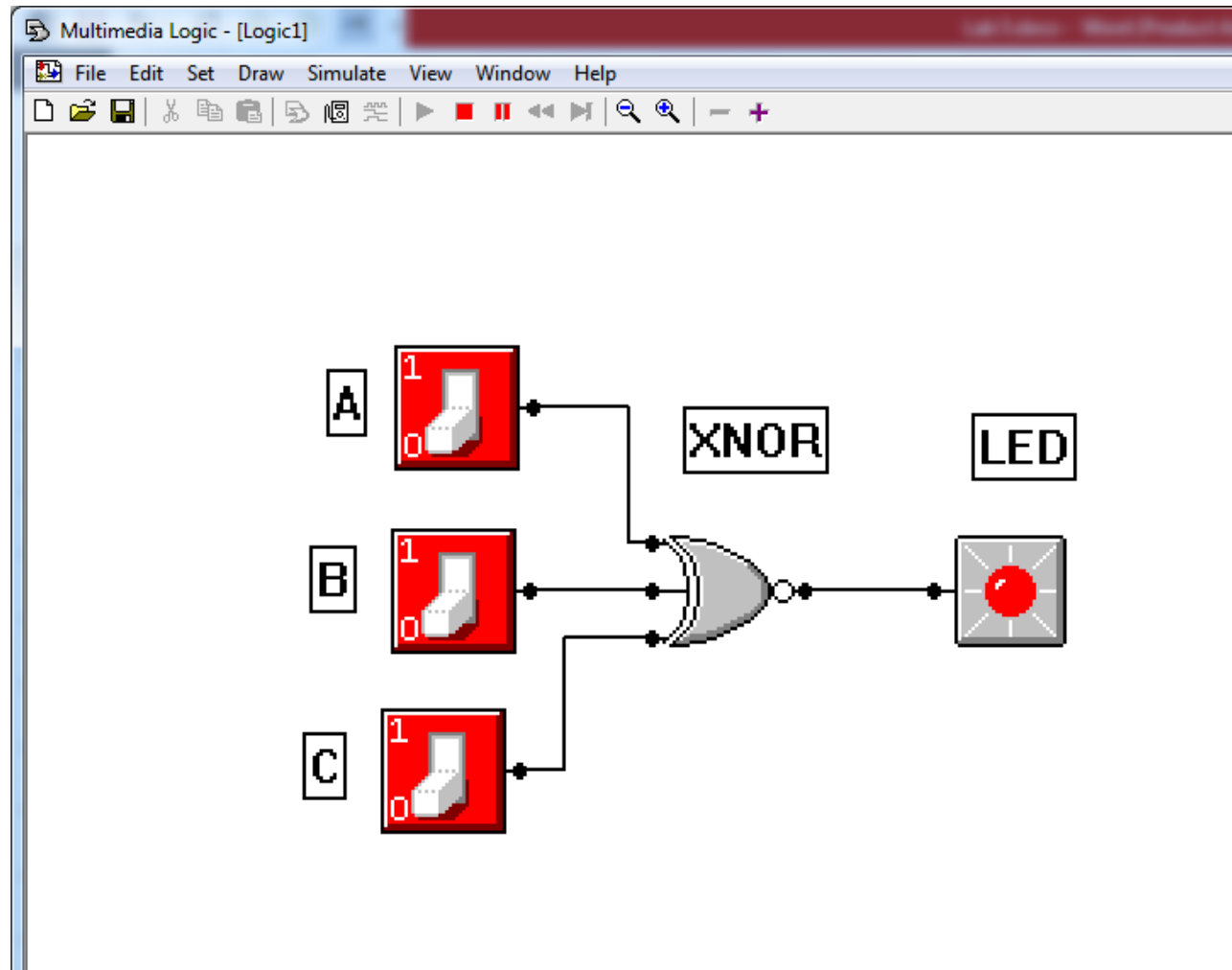


Truth Table

Switches		LED
0	0	Lit / 1
0	1	Dark / 0
1	0	Dark / 0
1	1	Lit / 1

XNOR is short for **Exclusive Nor**. This gate combines a [Xor Gate](#) with its output connected through an [Inverter Gate](#) in one device. The output of this gate is a "0" only if **one** of its inputs is a "1"

Negative Triple of 3-input XNOR Gate



Truth Table

Switches			LED
0	0	0	Lit / 1
0	0	1	Dark / 0
0	1	0	Dark / 0
0	1	1	Lit / 1
1	0	0	Dark / 0
1	0	1	Lit / 1
1	1	0	Lit / 1
1	1	1	Dark / 0

XNOR is short for **Exclusive Nor**. This gate will output a "0" if only **one** or **all** of

its inputs are a "1"