



AROR UNIVERSITY  
OF ART, ARCHITECTURE,  
DESIGN & HERITAGE,  
SUKKUR, SINDH

## Faculty of Artificial Intelligence & Multimedia Gaming

### BS – Multimedia Gaming

Digital Logic Design Lab

#### Lab # 03

Instructor: Engr. Muhammad Younis

#### Submission Profile

Name:

Submission date (dd/mm/yy):

Marks obtained:

Comments:

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Instructor

**Task 01: Construct and simulate the given Boolean expression in Multisim software.**

- Given Expressions:
  - $AB + A(B+C) + B(B+C)$
  - $AB + BC(B + C)$
  - $A + B(A + C) + AC$
  - $A'BC + AB'C + ABC' + ABC$
- Design the digital circuit in Multisim based on the above expressions.

**Task 02: Simplify the expression**

- Use the Boolean algebra rules to simplify the following Expressions:

Expression	Simplified Expression
1. $AB + A(B+C) + B(B+C)$	
2. $AB + BC(B + C)$	
3. $A + B(A + C) + AC$	
4. $A'BC + AB'C + ABC' + ABC$	

- Once you've simplified the expression, translate it into a digital circuit using Multisim software

**Task 3: Compare the circuits**

Expression	Simplified Expression
1. $AB + A(B+C) + B(B+C)$ <i>(Insert image of the circuit here)</i>	<i>Write the simplified expression here</i> <i>(Insert image of the circuit here)</i>
2. $AB + BC(B + C)$ <i>(Insert image of the circuit here)</i>	<i>Write the simplified expression here</i> <i>(Insert image of the circuit here)</i>
3. $A + B(A + C) + AC$ <i>(Insert image of the circuit here)</i>	<i>Write the simplified expression here</i> <i>(Insert image of the circuit here)</i>
4. $A'BC + AB'C + ABC' + ABC$ <i>(Insert image of the circuit here)</i>	<i>Write the simplified expression here</i> <i>(Insert image of the circuit here)</i>

#### Task 4: Compare the truth tables

- Fill in a table showing all possible input values (A, B, and C) for each simplified expression separately.

**Truth Table of:**

1.  $AB + A(B+C) + B(B+C)$

A	B	C	Output of expression	Output of simplified expression
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

**Truth Table of:**

2.  $AB + BC(B + C)$

A	B	C	Output of expression	Output of simplified expression
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

**Truth Table of:**

3.  $A + B(A + C) + AC$

A	B	C	Output of expression	Output of simplified expression
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

**Truth Table of:**

1.  $A'BC + AB'C + ABC' + ABC$

A	B	C	Output of expression	Output of simplified expression
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

**Task 05:** Compare the each circuit and outputs in truth table of each expression separately, and verify that they produce same output results for all possible input combinations or not.