



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

## **Faculty of Artificial Intelligence & Multimedia Gamming**

BS – Multimedia Gamming

Digital Logic Design Lab

### **Lab # 05: Karnaugh Map**

Engr. Muhammad Younis

#### **Submission Profile**

Name:

Submission date (dd/mm/yy):

Marks obtained:

Comments:

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Instructor

### Lab Learning Objectives:

Upon successful completion of this experiment, the student will be able:

- To Simplify a Boolean expression using Karnaugh maps
- To Use a circuit with inputs to derive:
  - The output experimentally and using Boolean algebra
  - The Karnaugh map

### Background Theory:

Karnaugh maps are useful for minimizing the number of logic gates needed in a circuit. In a practical sense, this reduction also results in a decrease in cost for a manufacturer since fewer components are needed to create an equivalent circuit.

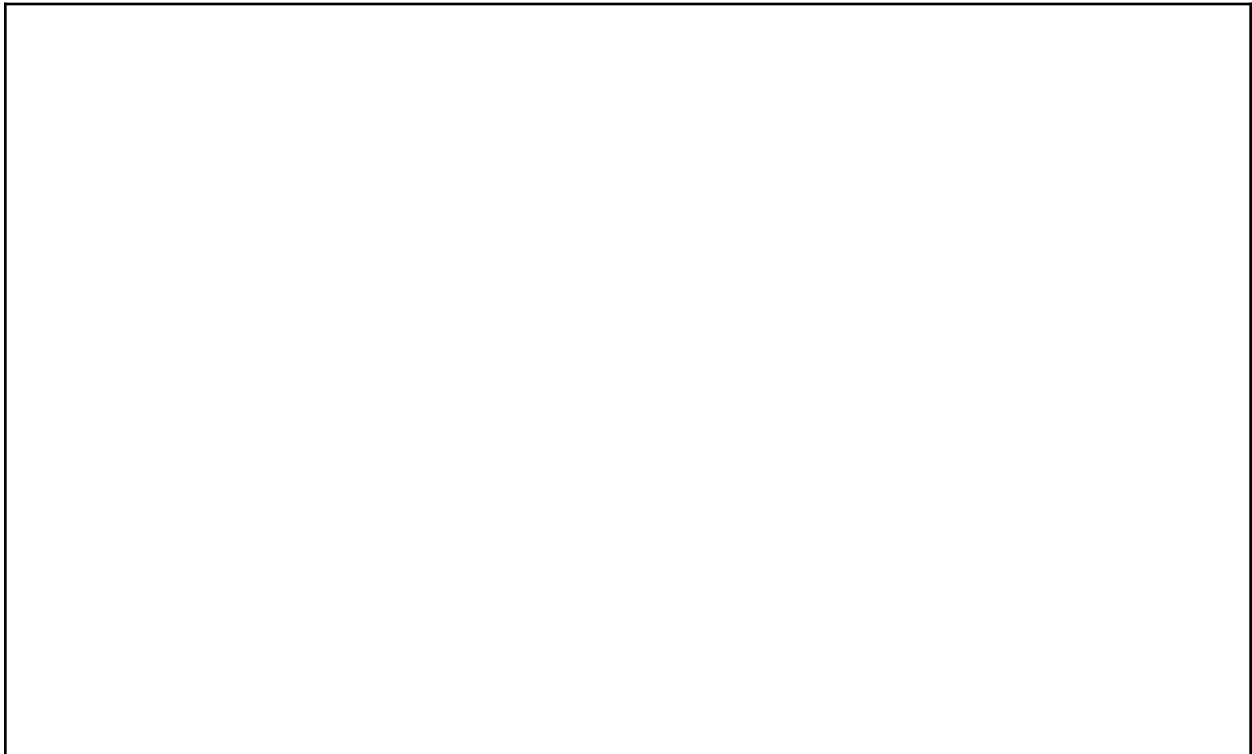
### Lab activities

#### Task 01: Working with 3-Variable Karnaugh Maps

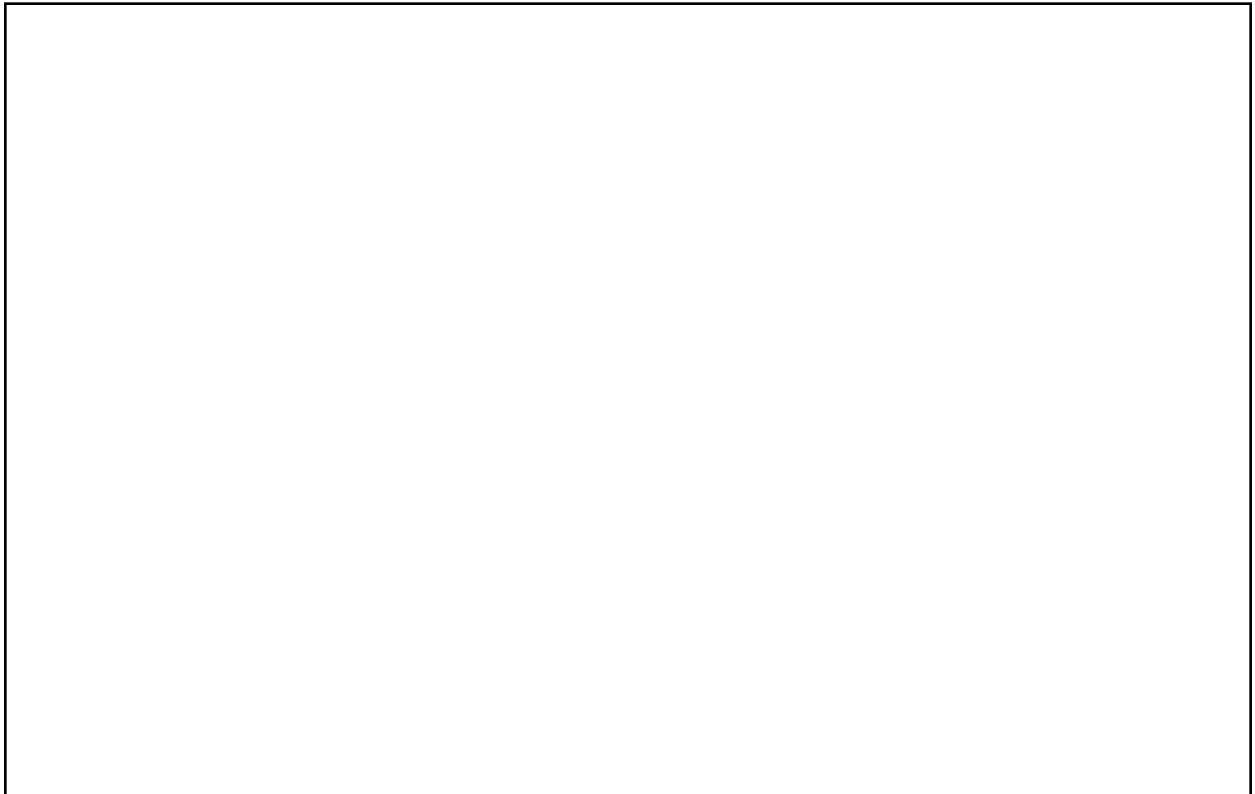
A. Translate the provided Boolean expression into a 3-variable Karnaugh map and then create the corresponding electronic circuit in Multisim software.

$$ABC + A'BC + A'B'C' + ABC' + A'BC' + AB'C'$$

Add the image of K-Map here

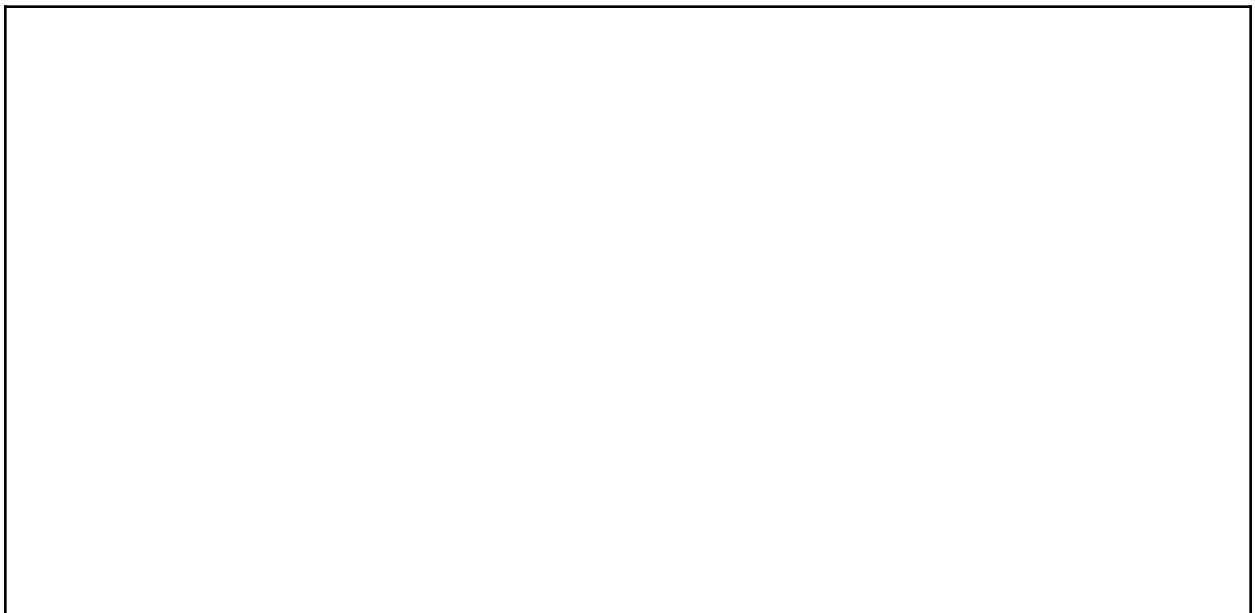


**Add the image of circuit here**



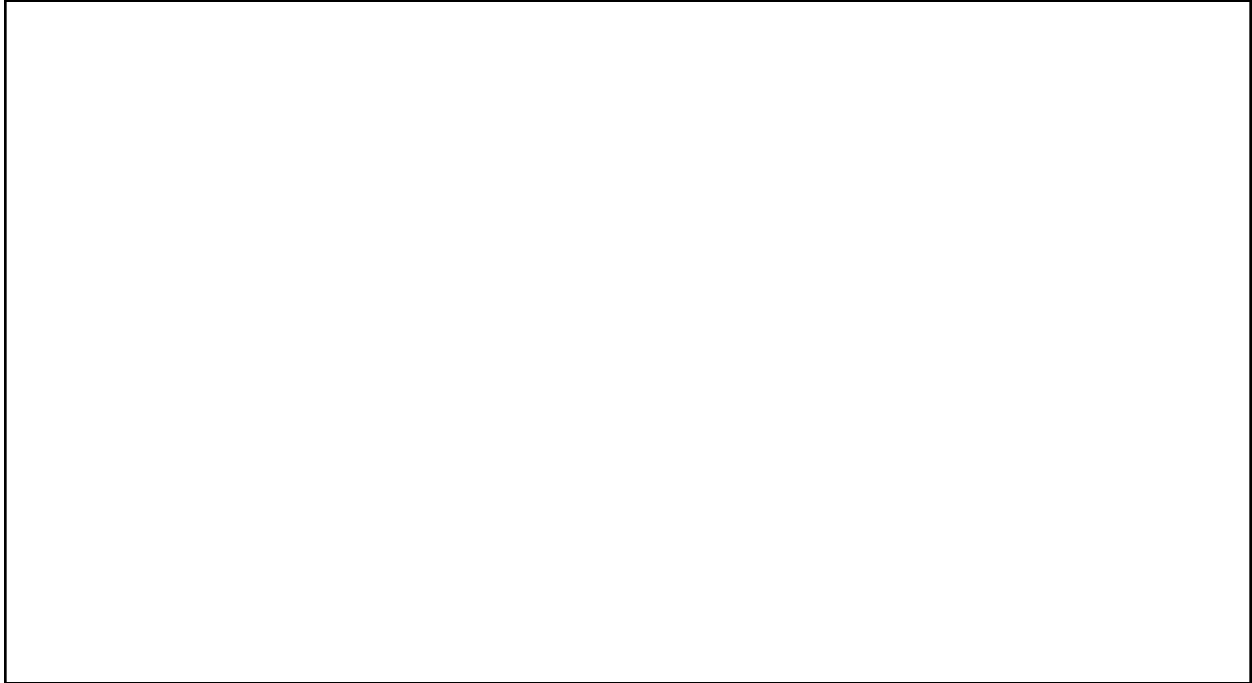
**B. Simplify the Boolean expression using the Karnaugh map.**

**Add the picture of solution**



**C. Construct the circuit for the simplified expression in Multisim software.**

Add the picture of simplified circuit



**D. Fill the following truth Table**

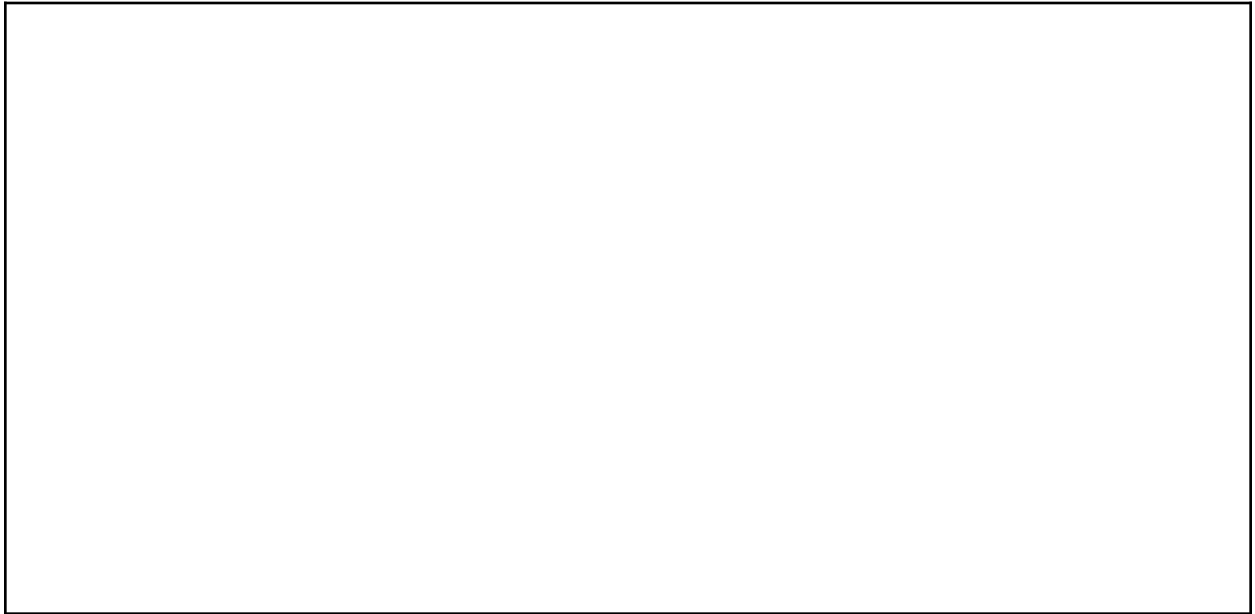
A	B	C	Original Expression	Simplified Expression
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

## Task 02: Working with 4-Variable Karnaugh Maps

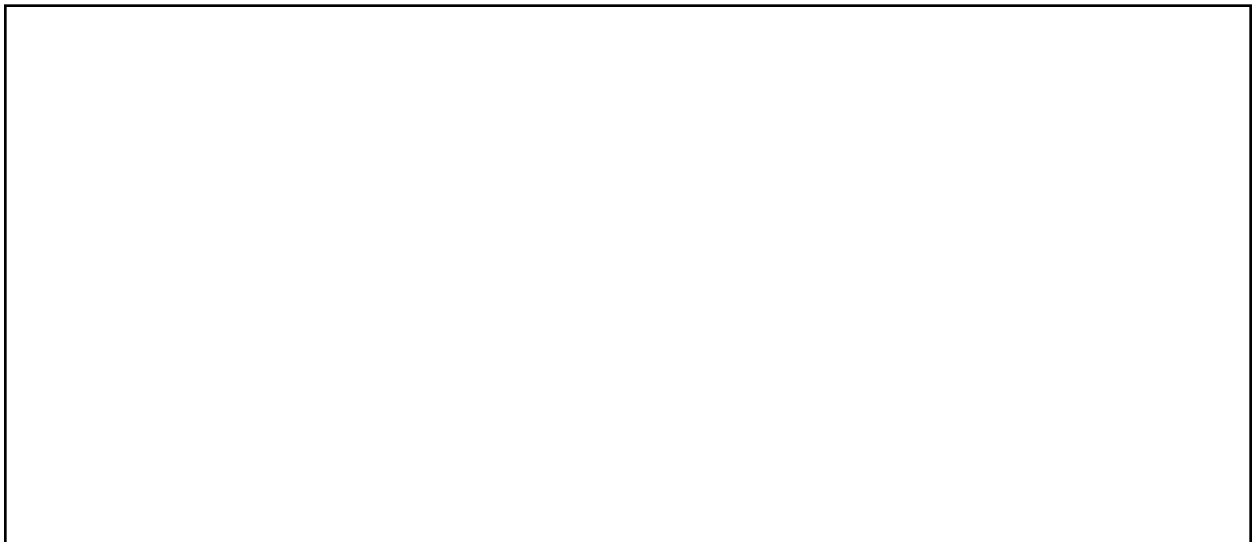
A. Map the provided Boolean expression into a 4-variable Karnaugh map and then create the corresponding electronic circuit in Multisim software.

$$ABCD + A'BCD' + A'B'C'D' + ABC'D' + A'BC'D + AB'C'D + ABCD' + A'BCD'$$

Add the image of K-Map here



Add the image of circuit here



**B. Simplify the Boolean expression using the Karnaugh map.**

Add the picture of solution

**C. Construct the circuit for the simplified expression in Multisim software.**

Add the picture of simplified circuit

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**D. Fill the following truth Table**

A	B	C	D	Original Expression	Simplified Expression
0	0	0	0		
0	0	0	1		
0	0	1	0		
0	0	1	1		
0	1	0	0		
0	1	0	1		
0	1	1	0		
0	1	1	1		
1	0	0	0		
1	0	0	1		
1	0	1	0		
1	0	1	1		
1	1	0	0		
1	1	0	1		
1	1	1	0		
1	1	1	1		