	AIR UNIVERSITY
	DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
	EXPERIMENT NO 4

Lab Title: _____

Student Name: _____ **Reg. No:** _____

Objective: _____

_____

LAB ASSESSMENT:

Attributes	Excellent (5)	Good (4)	Average (3)	Satisfactory (2)	Unsatisfactory (1)
Ability to Conduct Experiment					
Ability to assimilate the results					
Effective use of lab equipment and follows the lab safety rules					

Total Marks: _____ Obtained Marks: _____

LAB REPORT ASSESSMENT:

Attributes	Excellent (5)	Good (4)	Average (3)	Satisfactory (2)	Unsatisfactory (1)
Data presentation					
Experimental results					
Conclusion					

Total Marks: _____ Obtained Marks: _____

Date: _____ Signature: _____

EXPERIMENT 04

Boolean Expression Simplification and Implementation

Objectives:

- To understand the utilization of Boolean algebra in logic circuits.
- To write logic equation of a logic circuit from the logic diagram.
- Simplification of Boolean Expression using K-Map.

Equipment required:

- TTL IC-7408
- TTL IC-7432
- TTL IC-7404
- TTL IC-7400
- TTL IC-7402
- TTL IC-7486
- Digital Electronics Trainer

Task 1:

Simplify the given expression and follow the given steps to verify the circuit.

$$F = (X'Y'+Z)' + Z + XY + WZ$$

Steps:

1. Obtain the truth table for the expression given above.
2. Simplify the Expression using Boolean algebra.
3. Draw the logic diagram for the simplified expression.
4. Implement the circuit on trainer using the required logic gates and verify your circuit by applying all the possible input combinations to the circuit.

Simplified Expression:

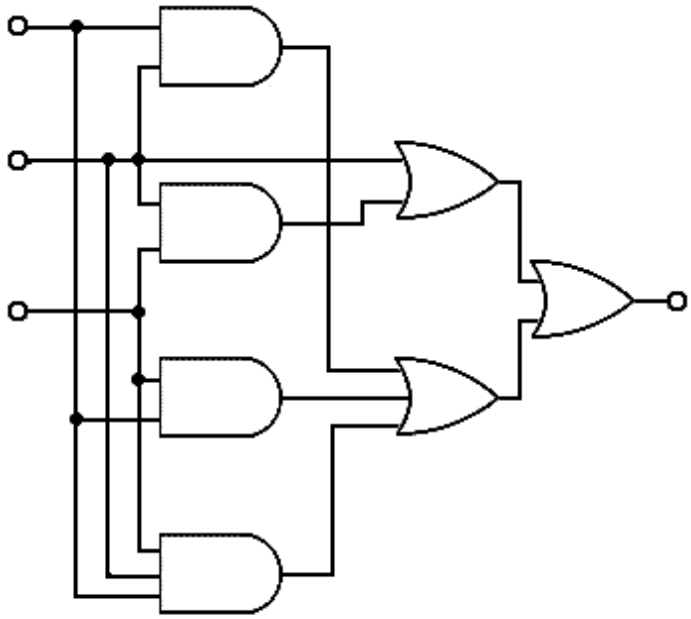
Logic Diagram:

Truth Table:

Inputs				Output
W	**X**	**Y**	**Z**	**F**
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	

Simulation Results:

Task 2:



Steps:

1. Write the Logic expression for the circuit.
2. Simplify the expression using Boolean algebra.
3. Obtain the truth table for the simplified expression.
4. Draw a new logic diagram for the simplified expression.
5. Implement the circuit on trainer using the required logic gates.
6. Verify your circuit by applying all the possible input combinations to the circuit.

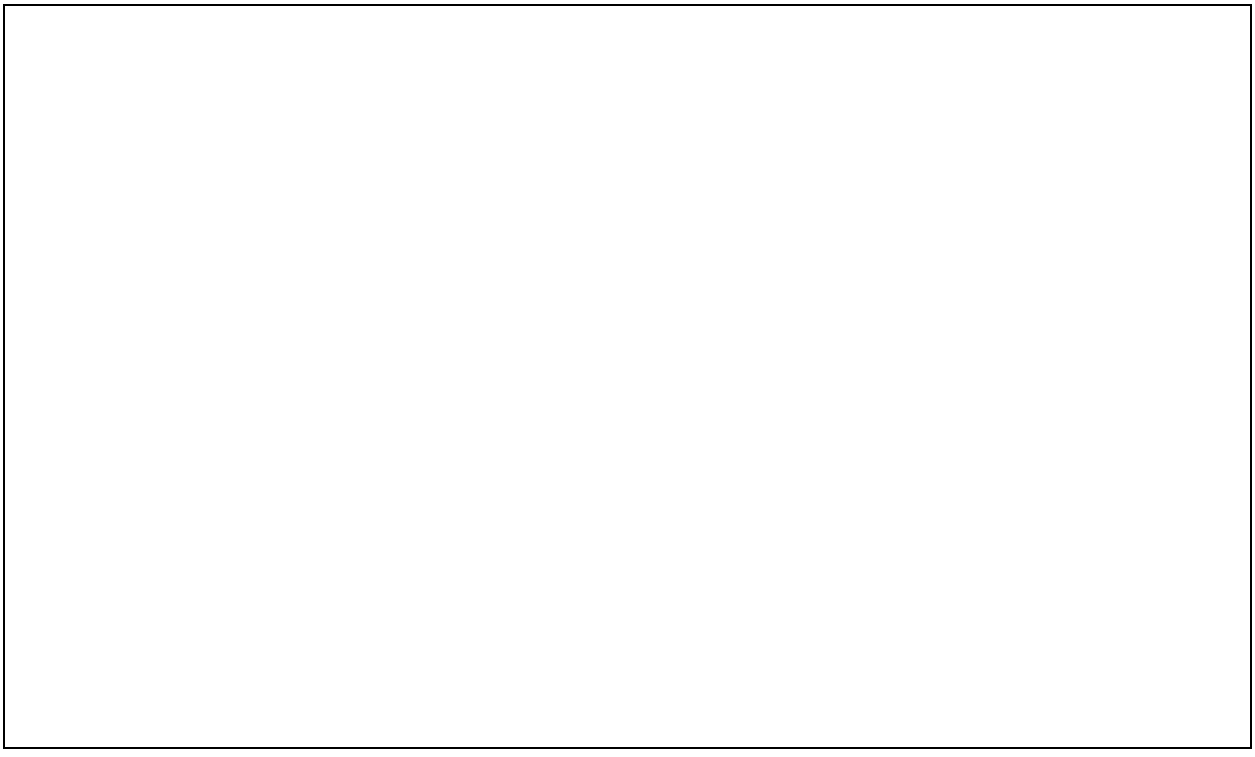
Logic Expression:

Simplified Expression:

Logic Diagram for the Simplified Expression:

Truth Table:

Simulation Results:



Task 3:

Expression:

$$F = A'C + A'B + AB'C + BC$$

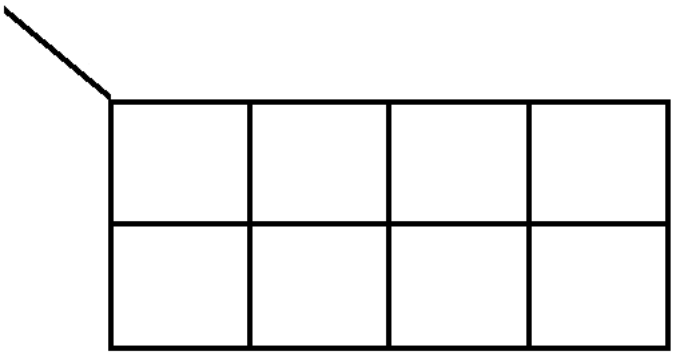
Steps:

1. Express the above mentioned expression in the form of sum of minterms.
2. Draw the K-Map for the function.
3. Find its simplified expression from K-map in SOP form.
4. Draw the logic diagram for the simplified expression.
5. Obtain a truth table for the simplified expression.
6. Implement the logic circuit on trainer using the required logic gates.
7. Verify your logic circuit by applying all the possible input combinations to the circuit.

Canonical Form:

$$F = \sum$$

K-MAP:



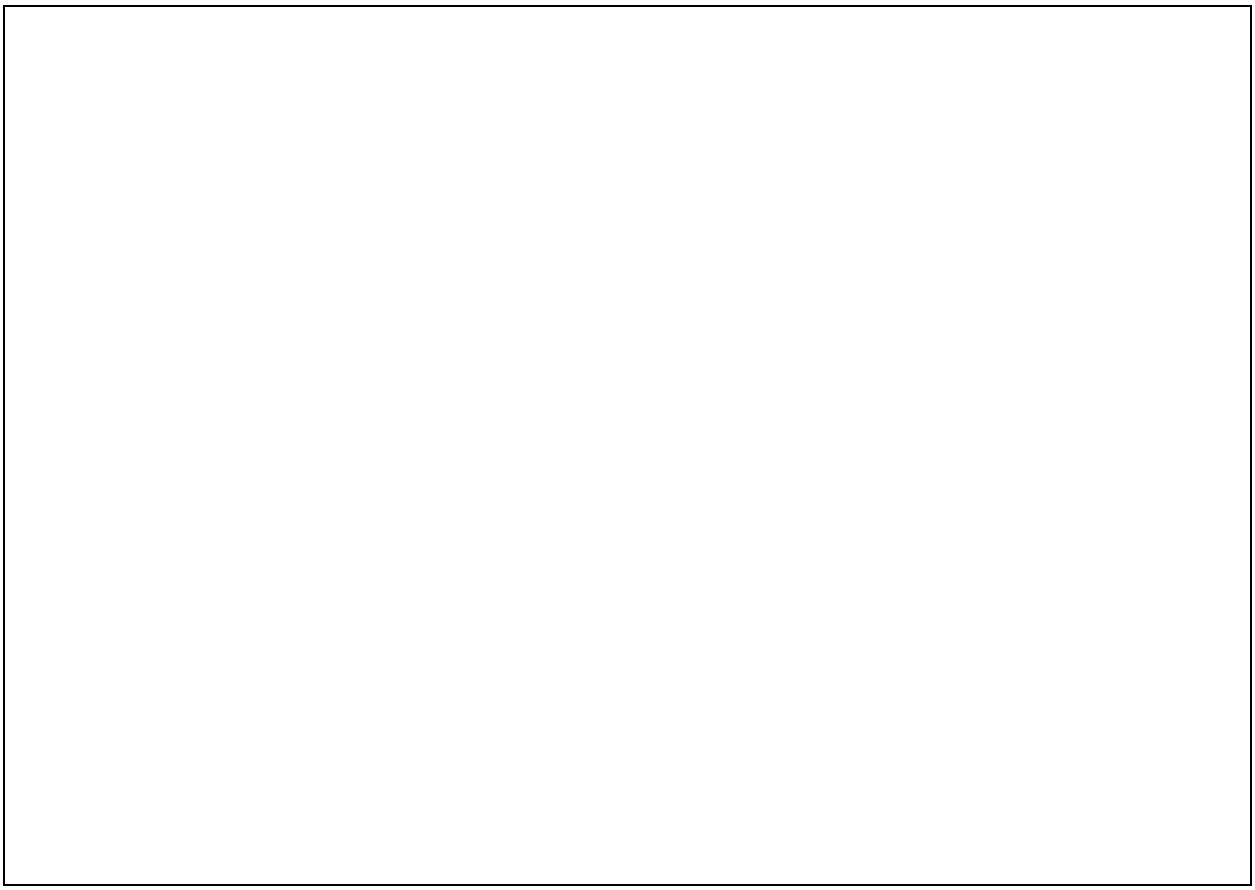
Simplified Expression:

Truth Table:

Inputs			Output
A	**B**	**C**	**F**
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Logic Diagram:

Simulation Results:



Conclusion: