



National University
Of Computer and Emerging Sciences

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CLASS: BS CS 2A2

SECTION: 2A2

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LAB TASK KMAP



Task # 1 :-

Find a reduced Boolean expression for the given K-Map.

Also, devise a truth table and simulate the circuit to verify your expression.

		CD			
		00	01	11	10
AB	00		1		
	01		1		
	11		1		
	10	1	1		1

Solution :-

KMAP And Expression Finding

IS On The Side :-

Reduced Expression For This Is

$$C'D + AB'D'$$

Task 1.

		CD			
		00	01	11	10
AB	00	m_0	m_1 1	m_3	m_2
	01	m_4	m_5 1	m_7	m_6
	11	m_{12}	m_{13} 1	m_{15}	m_{14}
	10	m_8 1	m_9 1	m_{11}	m_{10} 1

First Group:-

$$C'D(A'B' + A'B + AB + AB')$$

$$\downarrow$$

$$A'(1) \quad A(1)$$

$$(1) -$$

$$(C'D)$$

Second Group:-

$$1000 \rightarrow 1010$$

$$AB'C'D' \quad AB'C'D'$$

$$AB'D'(1)$$

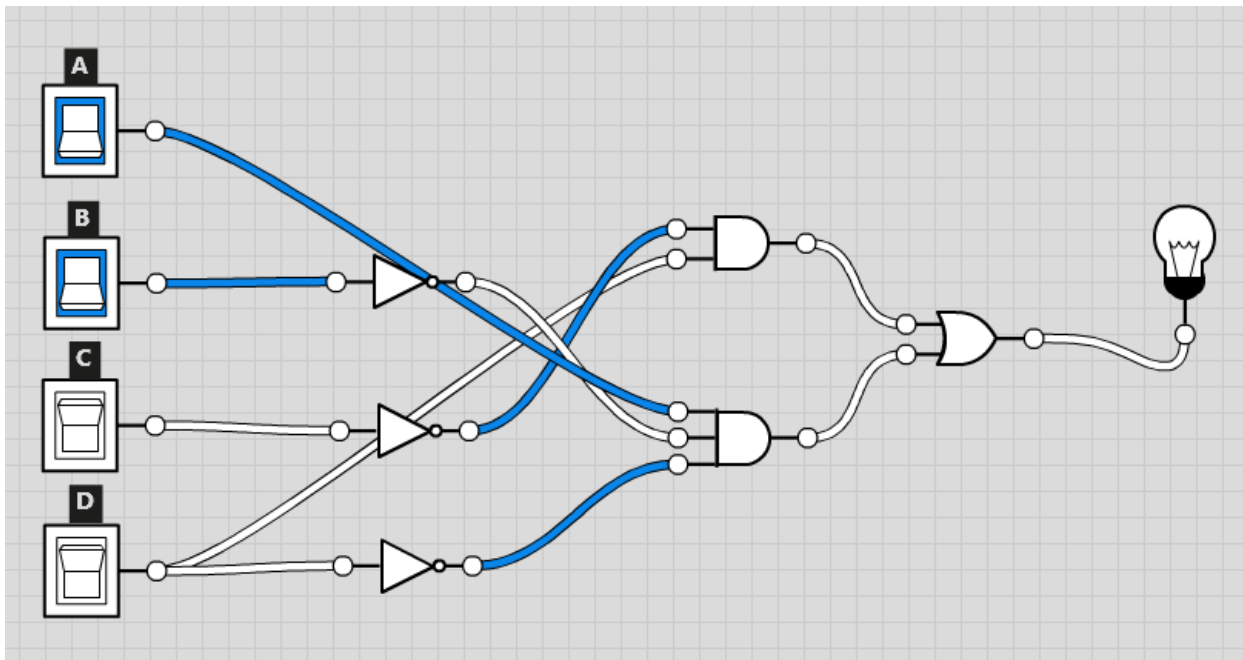
$$(AB'D')$$

Expression:-

$$C'D + AB'D'$$



Circuit Simulation Is :-



Truth Table For Task 1 Is :-

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0



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Task # 2 :-

For the given truth table, write a reduced Boolean expression (SOP) using K-Map.

Draw the circuit diagram for the reduced expression and simulate it to verify the truth table.

A	B	C	Out
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

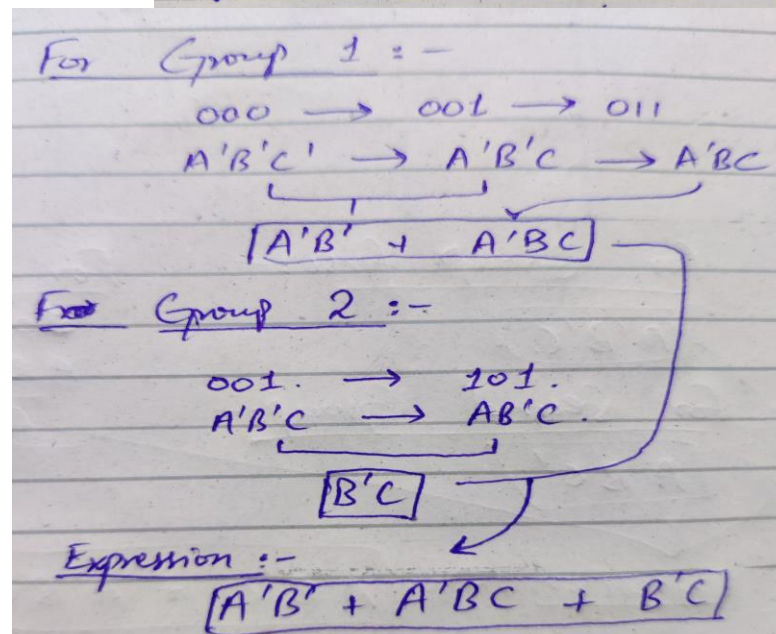
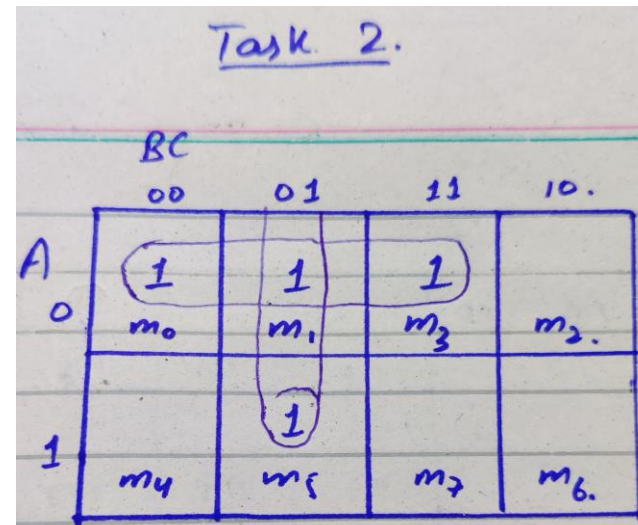
Solution:-

KMAP And Expression Finding IS On

The Side :-

Reduced Expression Is

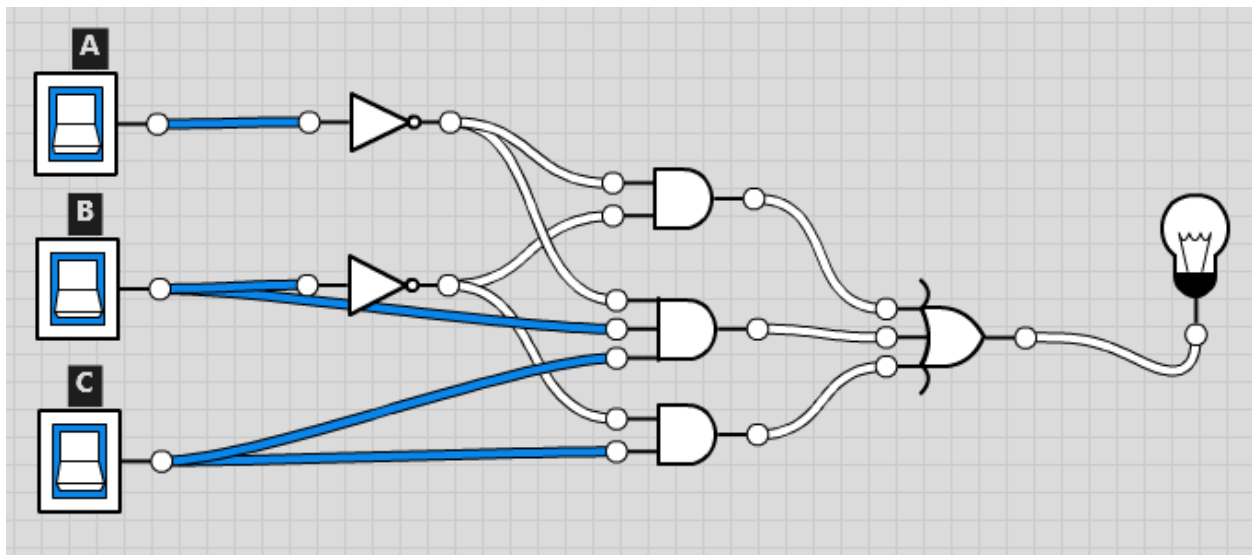
$$A'B' + A'BC + B'C$$





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Circuit Diagram Is :-



Task # 3 :-

Minimize the following function using K-Map. Verify the output expression with the help of simulation.

$$F(a,b,c,d) = \sum m(3,7,11,12,13,14,15)$$



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Solution:-

KMAP And Expression Finding IS On The Side :-

Task 3:-

CD.

	00	01	11	10
AB 00	m_0	m_1	1 m_3	m_2
01	m_4	m_5	1 m_7	m_6
11	1 m_{12}	1 m_{13}	1 m_{15}	1 m_{14}
10	m_8	m_9	1 m_{11}	m_{10}

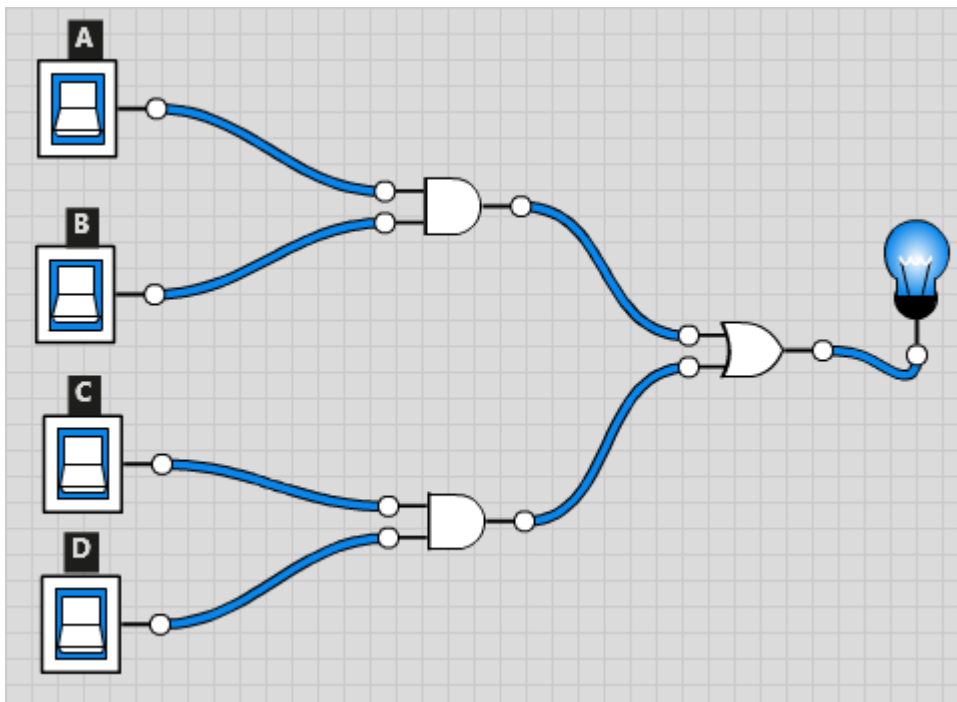
For Group 1:-
CD
For Group 2:-
 $AB(C'D' + C'D + CD + CD')$
↓
AB
Expression:-
 $CD + AB$

Minimized Expression Using K-Map Is:-

$$CD + AB$$



Circuit Diagram For This Task Is :-



Truth Table For Task 3 Is :-

A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



Task # 4 :-

For the function given below, write a reduced expression using K-Map reduction. Simulate the logic circuit for the expression devised after reduction. Also, fill in the truth table for the function.

$$F(A,B,C)=\pi(0,3,6,7)$$

Solution:-

KMAP And Expression

Finding IS On The Side :-

Reduced Expression Is :-

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

Task 4 :-

	BC 00	01	11	10
A 0	0 m_0	1 m_1	0 m_3	1 m_2
1	1 m_4	1 m_5	0 m_7	0 m_6

For Group first:- $A'B'C$

For Group second:- $A'BC'$

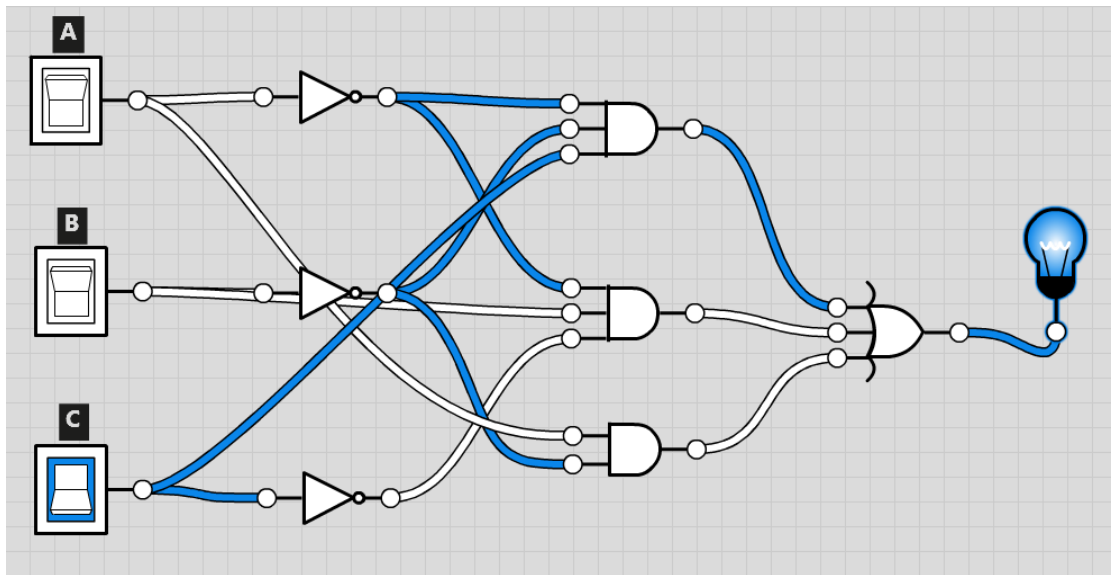
For Group third:- AB'

Expression:- $A'B'C + A'BC' + AB'$



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Circuit Diagram For This Task Is :-



Truth Table For This Task Is :-

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0