

Experiment No: 02

Name of the experiment: Deriving logic equations and truth table for from a given statement or expression and construction of combinational circuit.

Group no: 03

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Course Title: Digital Logic & Circuit Lab

Section: M

Date of experiment: 02/06/2022

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Objective of the experiment:

To derive a logical circuit using a problem statement and apply a digital logic equation into it.

List of components:

1. Digital trainer board
2. IC
3. Power supply
4. Wires.

IC List:

IC 7432: 1 pc
IC 7408: 1 pc
IC 7404: 1 pc
IC 7402: 1 pc
IC 7400: 1 pc
IC 7486: 1 pc

Data table and Calculation:

Truth table.

A	B	C	D	Y
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Symbol, block diagram and figures:

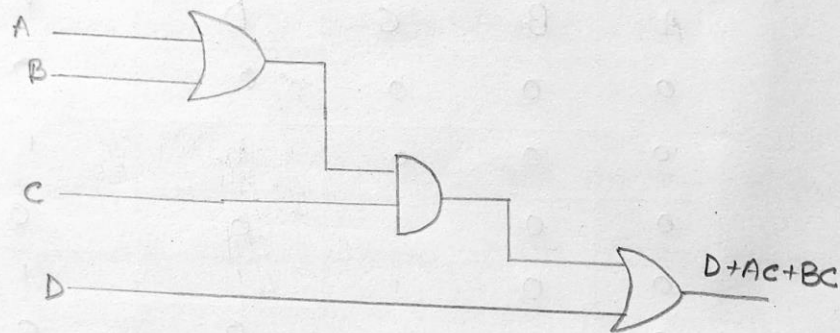
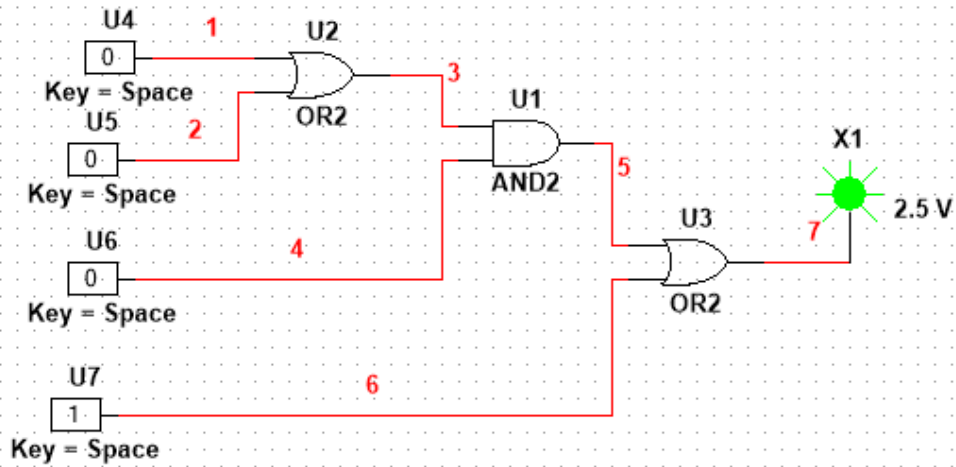
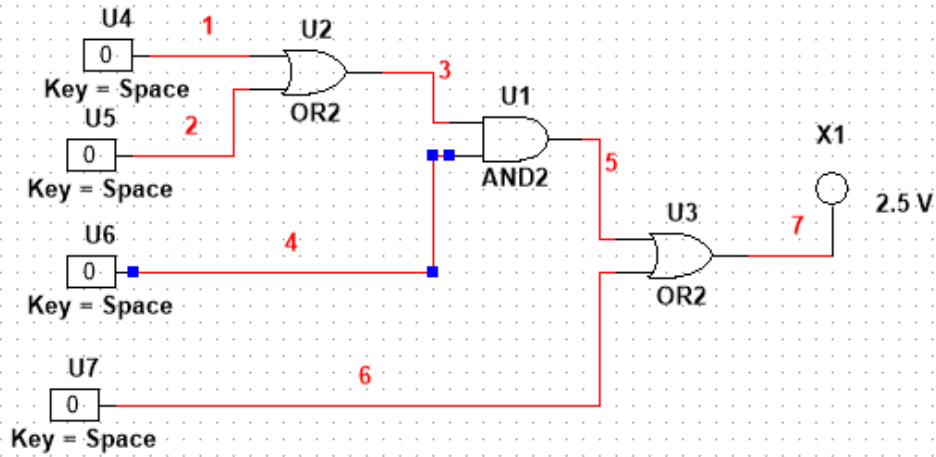
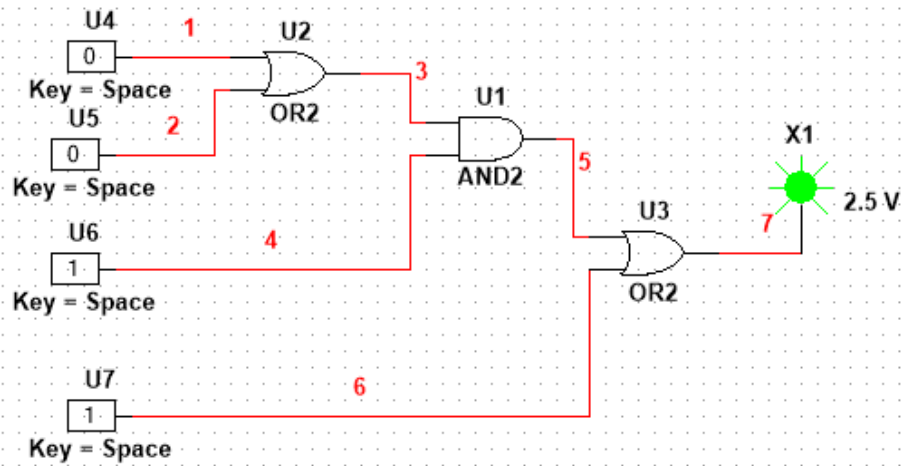
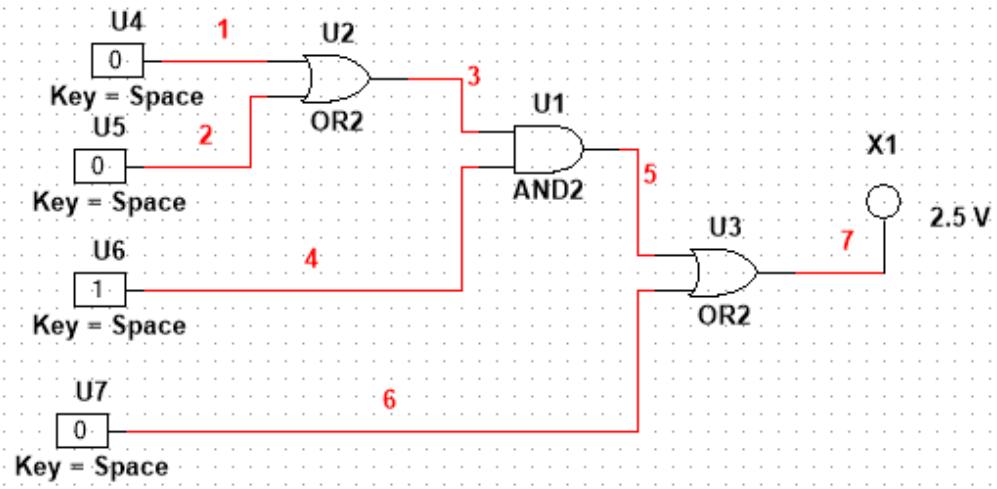


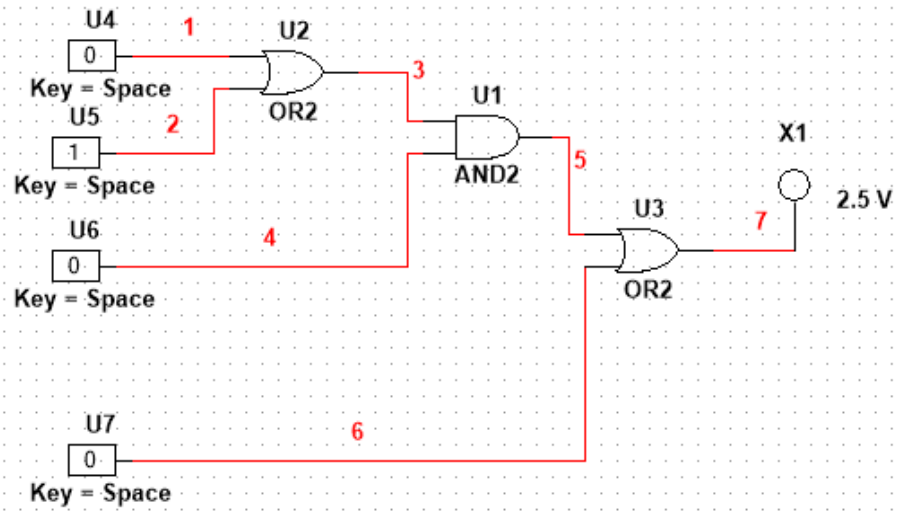
Figure: circuit diagram

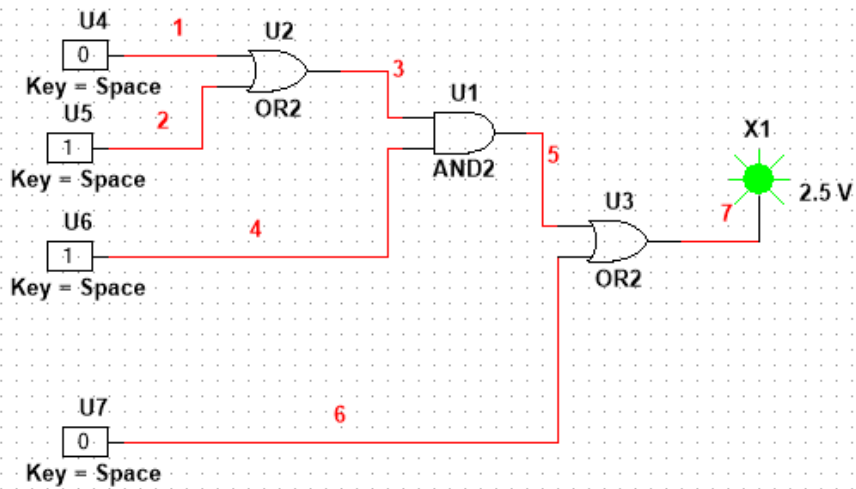
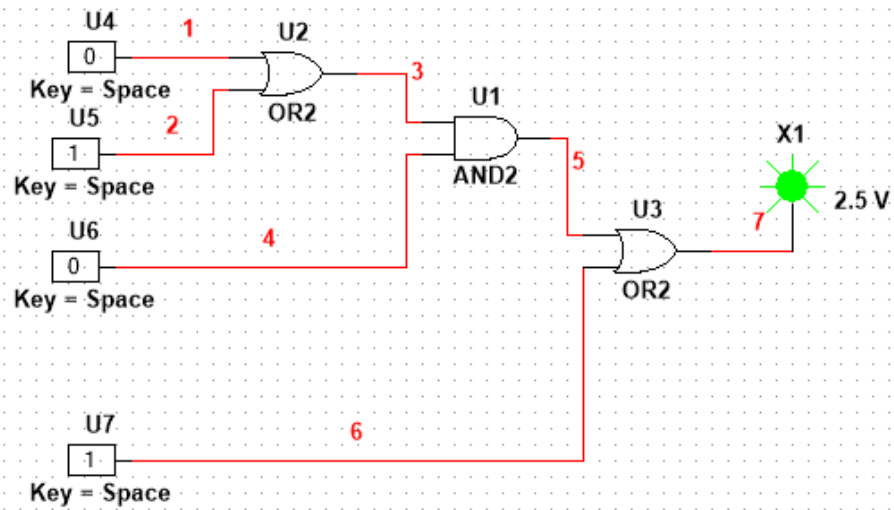
Example 1

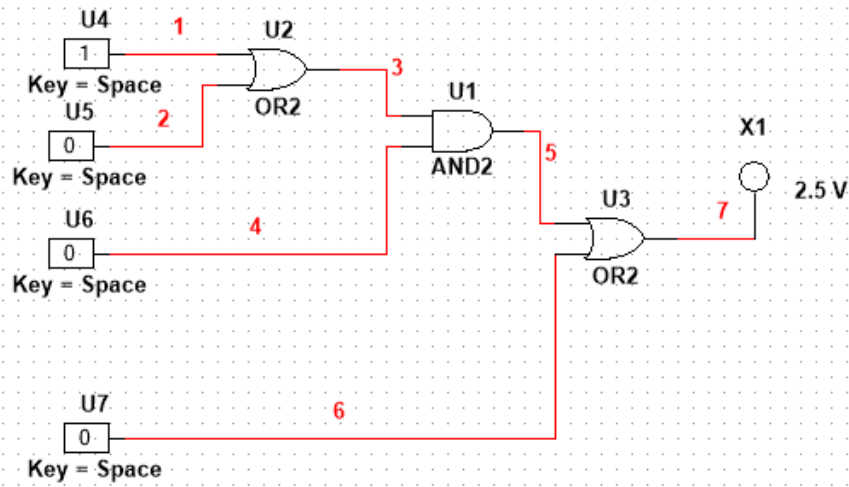
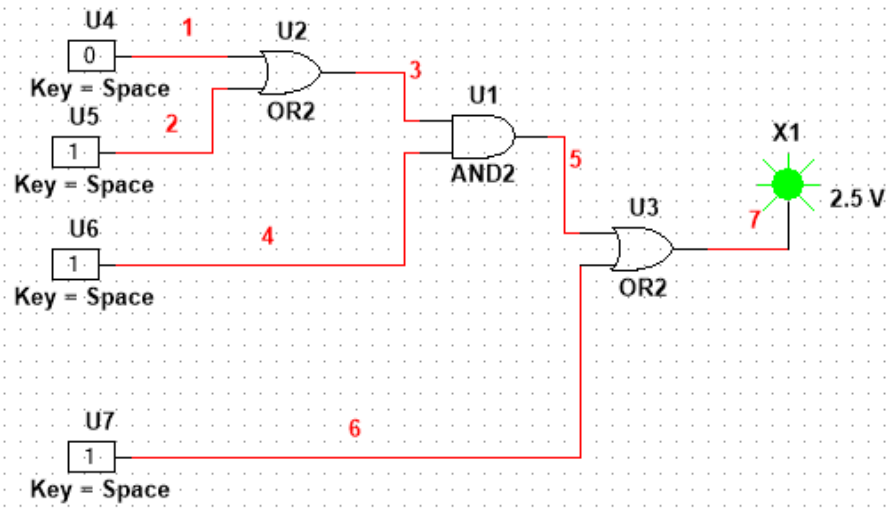
Simulation:

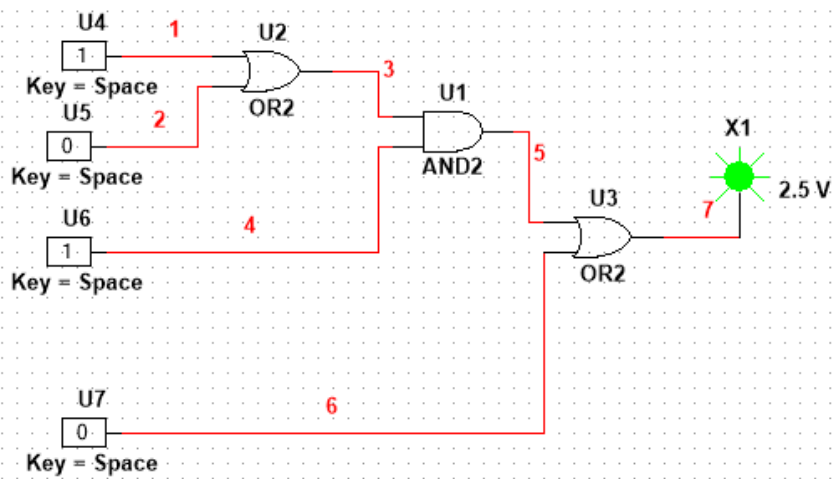
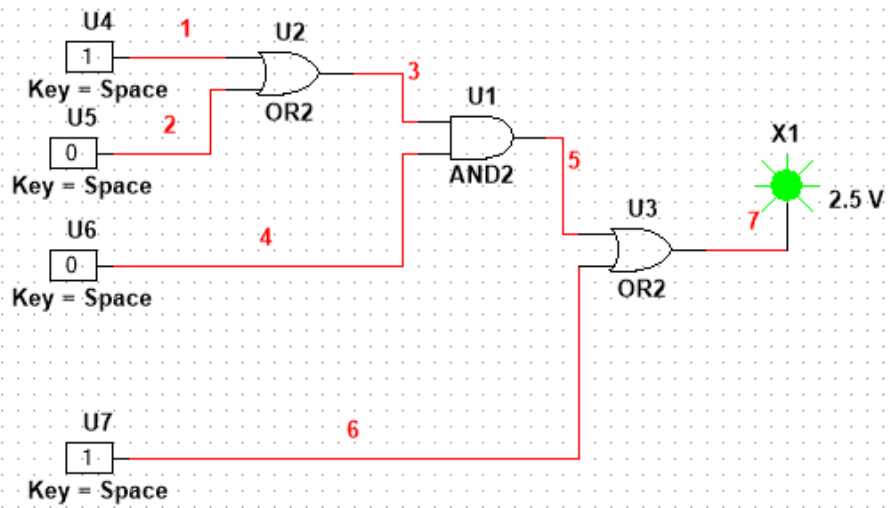


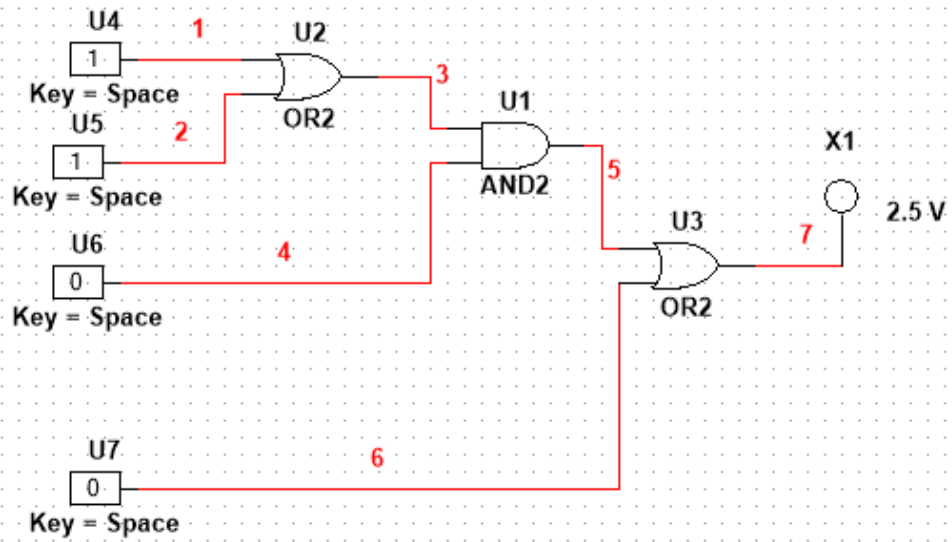
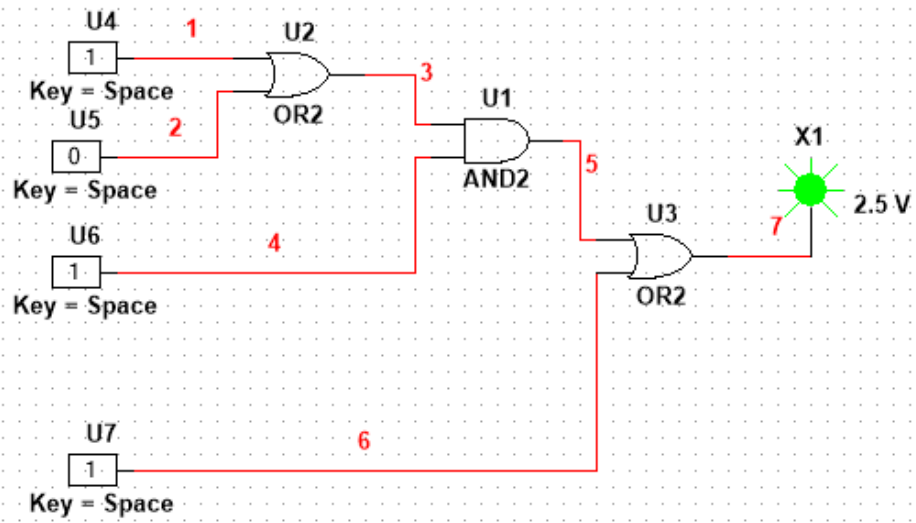


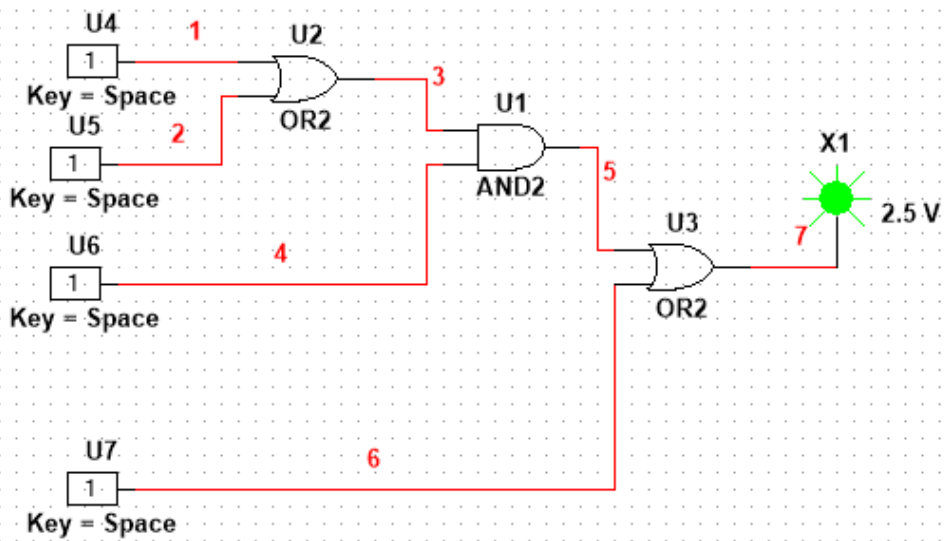
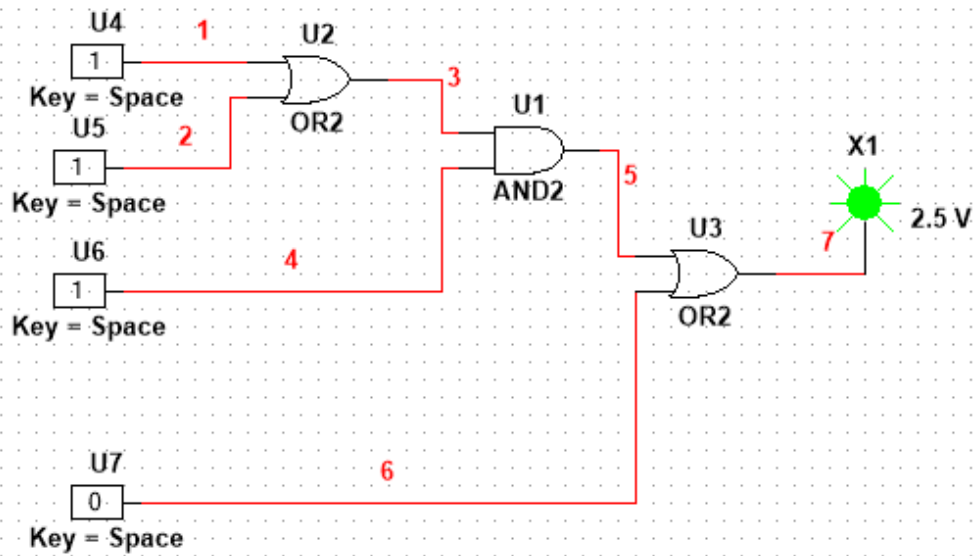












Discussion:

In the Problem 1 and 02, there is a statement, where we need to develop an logical gate to satisfy the condition using various gates.

In the condition, it states that, we have to make such an system, where each floor have different switches to operate. And after turning switch from different floor, the water motor will turned on. From the KMap, we find a logic where it state that a equation. From that equation, we can see that, we need to use 2 OR gate (IC 7432) and one AND gate circuit (IC 7408). Although there are total 3 circuits we need to develop, we use 2 IC to make it. Each IC has its own gate of 4. So, we give some inputs into it and connect it into the trainer board.

After putting some power into the IC we can see, its truth table and output are same. So, we can say that, it has satisfied our condition.

Conclusion:

From the theoretical part and the experimental data, we find that both of them are providing us the same result. So, we can say that the condition is satisfied.

Remarks:

- (i) Some IC gates may not be functional due to multiple time uses.
- (ii) IC pins are assigned to the clockwise notation.

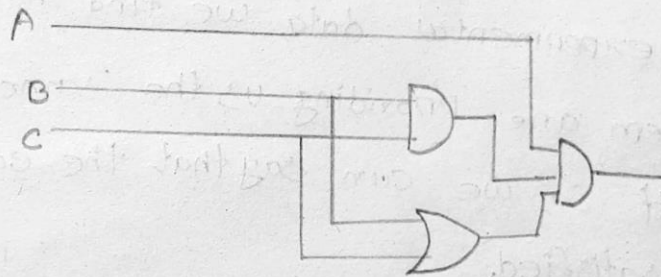
Reference:

1. Thomas L Floyd "Digital Fundamentals"

Question from Lab manual:

Given Expression:

$$Y = ABC + AB + AC$$
$$= A (BC + B + C)$$



Circuit diagram.

