

MICRO-PROJECT REPORT

ON

Build a Circuit for implementing 4 bit Subtractor

In Partial fulfilment of Diploma in Computer Engineering

(Second Semester)

In the subject of

FC3403 Digital Electronics

By

Mr. Ayush Shashikant Bulbule (19CM007)

Submitted To



Government Polytechnic, Amravati

(An Autonomous Institute of Govt. of Maharashtra)

Under the guidance of

Mr. Kamlesh Madavi

Lecturer in Digital Electronics (FC 3403)

Department of Computer Engineering

Government Polytechnic, Amravati

(2020-2021)



Government Polytechnic, Amravati.

(An Autonomous Institute of Govt. of Maharashtra)

Department of Computer Science & Engineering

Certificate

This is to certify that Mr. Ayush Shashikant Bulbule Identity Code:

19CM007 of Third Semester Diploma in **Computer Engineering** has

satisfactorily completed the micro project entitled “**Building a circuit**

to implement 4bit Subtractor” in **(CC 1403) Basic Chemistry** for the

academic year 2020-21 as prescribed in curriculum.

Place: Amravati

Date: / /

Lecturer in Digital Electronics

Vision

Provide skilled professionals in Computer Engineering to contribute towards the advancement of technology useful for society and industrial environment.

Mission

M1. Impart need based and value based education by providing exposure of latest tools and technologies in the area of computer engineering to satisfy the stakeholders.

M2. Upgrade and maintain facilities for quality technical education with continuous effort for excellence in Computer Engineering.

M3. Train students with Computer Engineering knowledge to apply it in the general disciplines of design, deployment of software and integration of existing technologies for E-governance and for benefit of society.

M4. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team spirit and ethical responsibilities.

M5. Provide an academic environment and consultancy services to the industry and society in the area of Computer Engineering.

Title of Micro-Project

Build a circuit for implementing 4 bit subtractor

1.0 Brief Introduction :

In Digital Circuits, A Binary Subtractor is one which is capable subtraction of binary numbers in one circuit itself. The operation being performed depends upon the binary value the control signal holds. It is one of the components of the ALU (Arithmetic Logic Unit).

2.0 Aim of the Micro-Project

This Micro-Project aims at :

1. To learn binary subtractor using gates.
2. To build circuit .

3.0 Action Plan (Sequence and time required for major activities for 8 weeks)

S.N.	Details of activity	Planned start date	Planned Finish date	I. Code &Name of Team Members
1	Gathering Contents	5/2/2020	12/12/2020	(19CM003) Bhagyashree Tekade
2	Making Circuit	27/12/2020	9/1/2021	(19CM007) Ayush Bulbule (19CM033) Malhar Joshi
3	Making Report and File	9/1/2021	19/1/2021	(19CM020) Pratham Gaur
4	Planning(Proposal submission)	13/12/2020	19/12/2020	(19CM057)Akanksha Shewatkar

4.0 Resources Required (major resources such as raw material, some machining facility, software etc.)

S.N.	Name of Resource/material	Specifications	Remarks
1	Internet	-	
2	Books	Digital Electronics	
3	Logic Circuit Application	-	

5.0 Names of Team Members with Identity Codes:

- i. Bhagyashree Tekade (19CM003)
- ii. Ayush Bulbule (19CM007)
- iii. Pratham Gaur (19CM020)
- iv. Malhar Joshi (19CM033)
- v. Akanksha Shewatkar (19CM057)

Guideline for Assessment of Micro-Project

Evaluation as per suggested Rubric for Assessment of Micro-Project

Assessment Parameter	Characteristic to be assessed	Average (1 mark)	Good (1.5 mark)	Excellent (2 mark)
Process Assessment (06)	Relevance of the courses & proposals			
	Literature survey/market survey/information collection			
	Analysis of data & completion of the target as per proposal/			
Product Assessment (04)	Report Preparation/Quality of Prototype/model			

Annexure

Title of Micro Project

Build a circuit for implementing 4bit subtractor

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2.0 Aim of the Micro-Project

This Micro-Project aims at:

- 1) To learn binary subtractor using gates.
- 2) To build circuit .

2.0 Course Outcomes Integrated

- 1) Classify different memory used in digital systems.
- 2) Classify combinational logic circuits for hardware design.

4.0 Actual Procedure Followed

- 1) Bhagyashree Tekade:
- 2) Ayush Bulbule:
- 3) Pratham Gaur:
- 4) Malhar Joshi:
- 5) Akanksha Shewatkar:

5.0 Actual Resources used (Mention the actual resources used)

S.N.	Name of Resource/material	Specifications	Remarks
1	Internet	-	
2	Books	Digital Electronics	
3	Logic Circuit Application	-	

6.0 Output of the Micro-Project

Output of this Micro-Project is attached to this file.

7.0 Skill Developed / Learning outcomes of this Micro-Project

- To build circuit.
- To Learn about binary subtractor

8.0 Assessment by Faculty as per Rubrics

Process Assessment (06)	Product Assessment (04)	Total Marks (10)	Signature of Faculty

Build a circuit for implementing 4bit subtractor

What is subtractor?

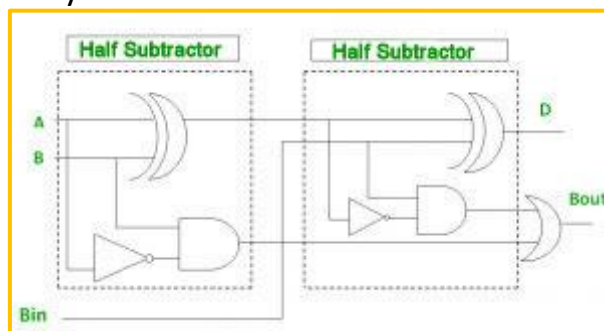
Subtractor is an electronic logic circuit for calculating the difference between two binary numbers which provides the difference and borrow as output.

Types of Subtractor

- Half Subtractor
- Full Subtractor

Half Subtractor

Half subtractor is used for subtracting one single bit binary number from another single bit binary number.

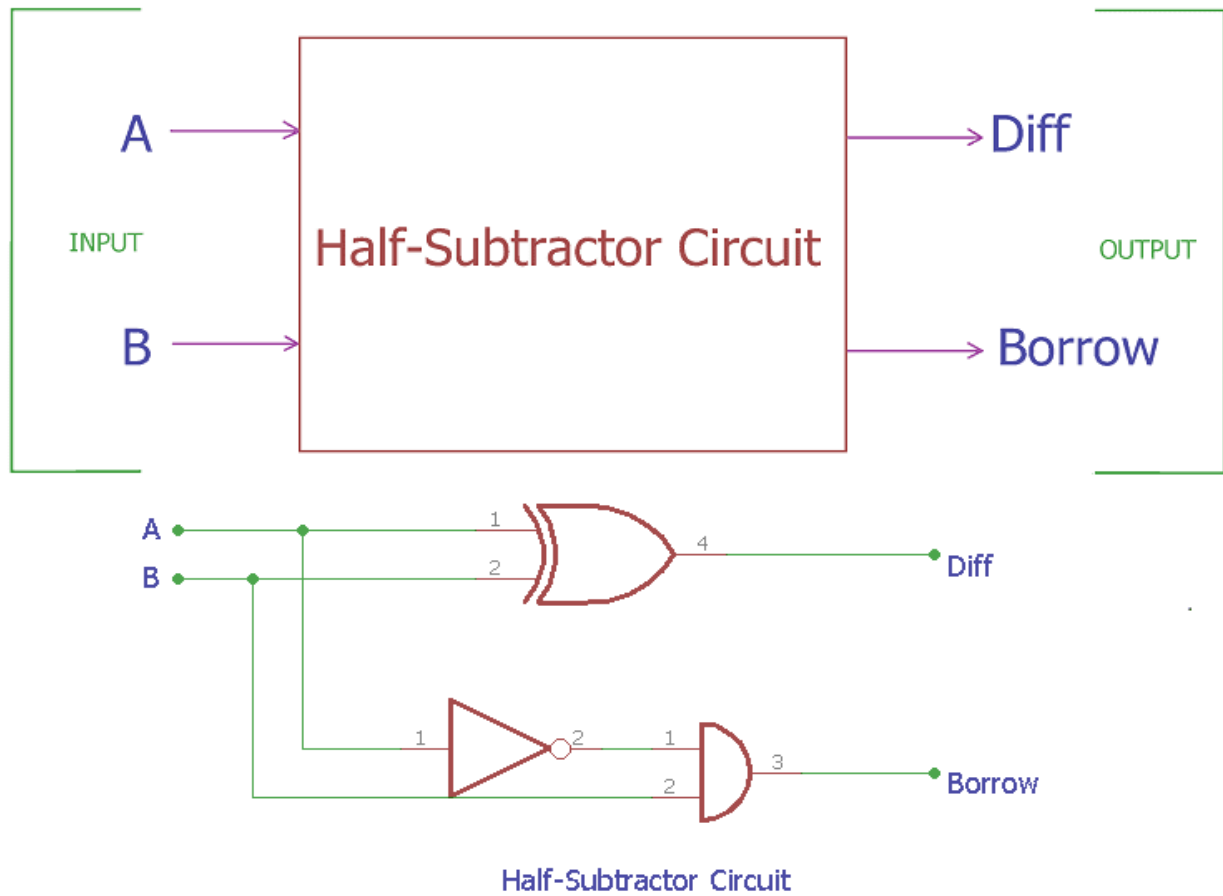


It has two inputs : Minuend (A) and Subtrahend (B) and two outputs :Difference (D) and Borrow (B).

Truth Table

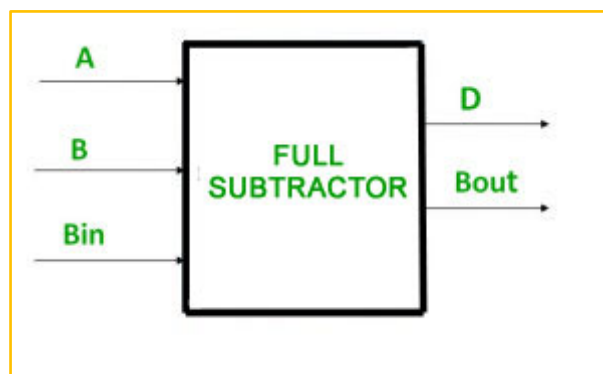
Inputs		Outputs	
X	Y	D	B
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

Half Subtractor Circuit



Full Subtractor

A logic circuit which is used for subtracting three single bit binary numbers is known as full subtractor.

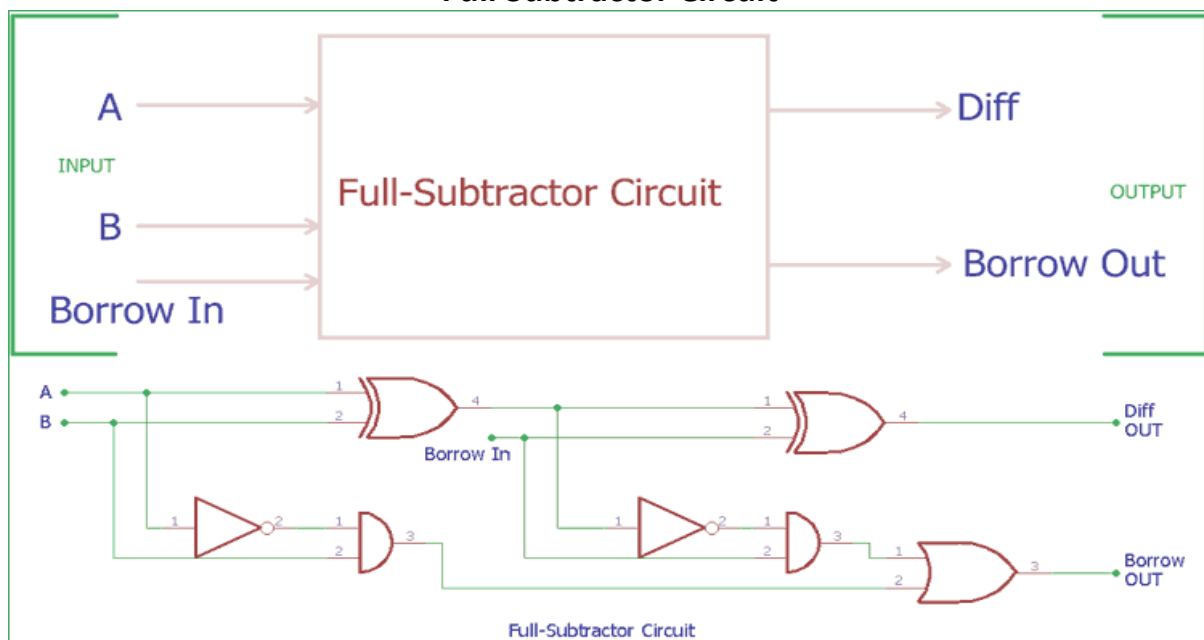


It has three inputs: minuend(A),Subtrahend(B), and the following Subtrahend and two outputs: Difference (D) and Borrow (B).

Truth Table

Input			Output	
A	B	C	Difference	Borrow
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Full Subtractor Circuit

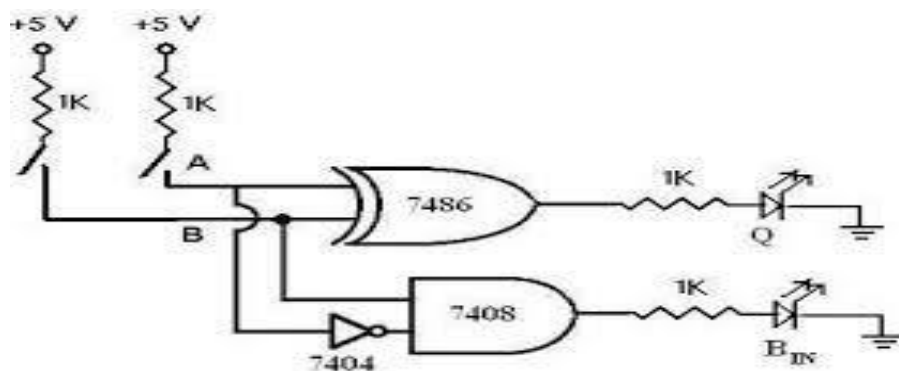


Circuit components/equipment:

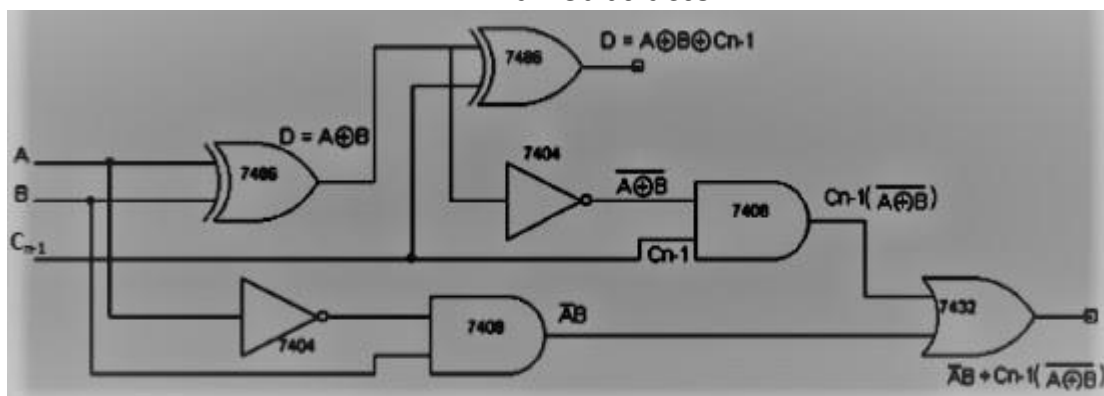
1. Resistors(1Ω,5 Nos)
2. ICs(XOR -7486, AND -7408, OR -7432, NOT -7404)

3. A surface mount dip switch
4. D.C. Power supply (5V)
5. Red LEDs(2 Nos)
6. Connecting wires
7. Breadboard

Circuit Diagram



Half Subtractor



Full Subtractor Circuit

Procedure:

1. Assemble the circuits one after another on your breadboard as per the circuit diagrams.
2. Connect the ICs properly to supply (pin14) and ground (pin 7) following the schematics for different ICs shown above.

- Using dip switch and resistors, facilitate all possible combinations of input from the power supply.
- Turn on power to your experimental circuit.
- For each input combination, note the logic state of the outputs as indicated by the LEDs (ON =1;OFF=0) and record the result in the table.
- Compare your results with the truth table for operation.
- When you are done ,turn off the power to your experimental circuit.

Requirements Table:

S. No.	Name of Resource	Suggested Broad Specification	Quantity	Remark
1	Multi-meter	Digital Multimeter:3 ½ digital display	1	
2	IC Tester	Digital IC Tester	1	
3	Breadboard	5.5cm X 17 cm	1	
4	DC power supply	+5 V Fixed power supply	1	
5	IC 1	7486	1	
6	IC 2	7404	1	
7	IC 3	7408	1	
8	IC 4	7432	1	
9	LED	Red /Yellow color 5 mm	2	
10	Connecting wires	Single strand 0.6 mm Teflon coating	As required	
11	Resistors	330 Ω,0.25 W	2	

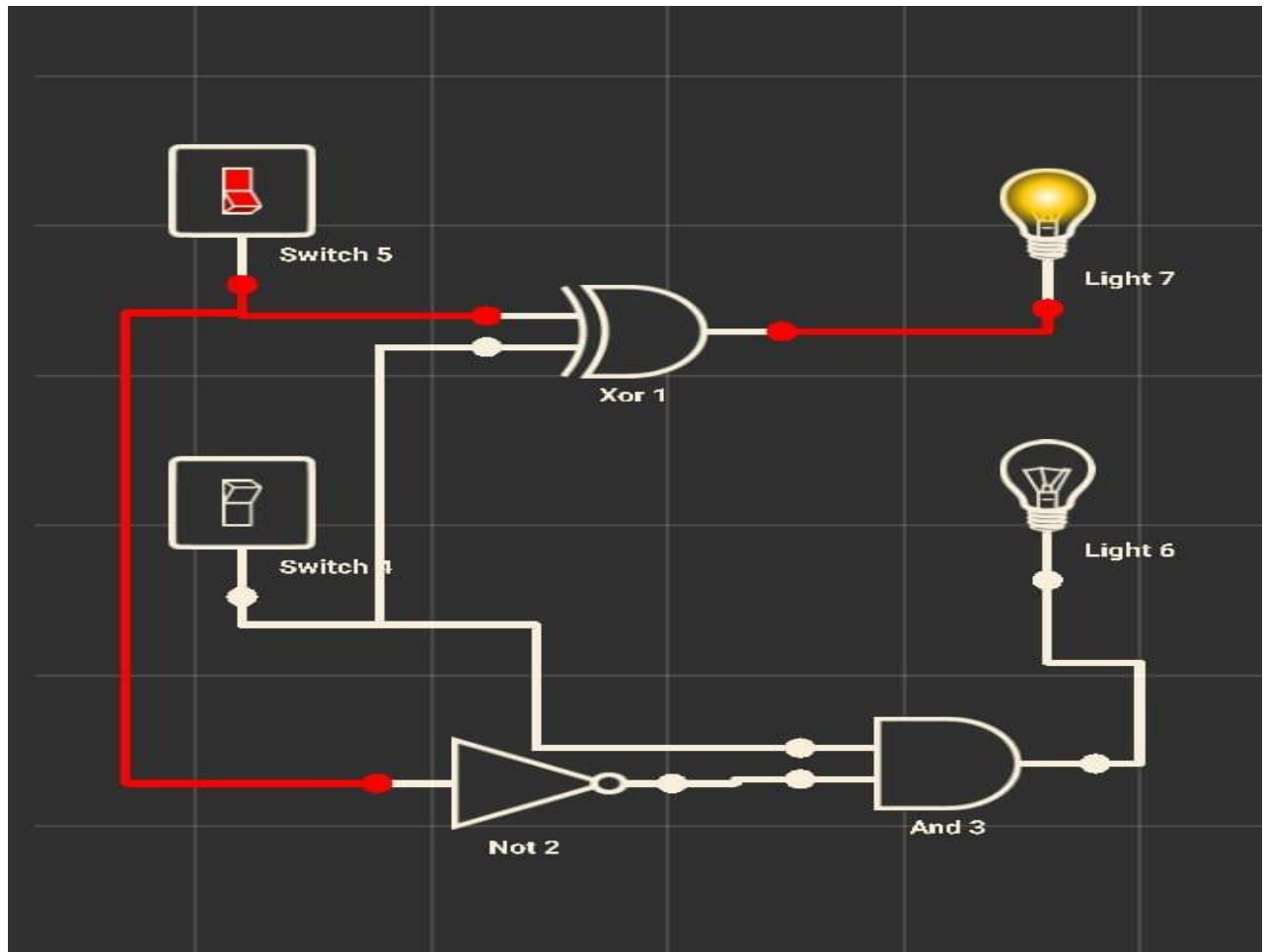
Precautions to be followed

Do not switch ON the power supply unless you have checked the circuit connections as per the circuit diagram.

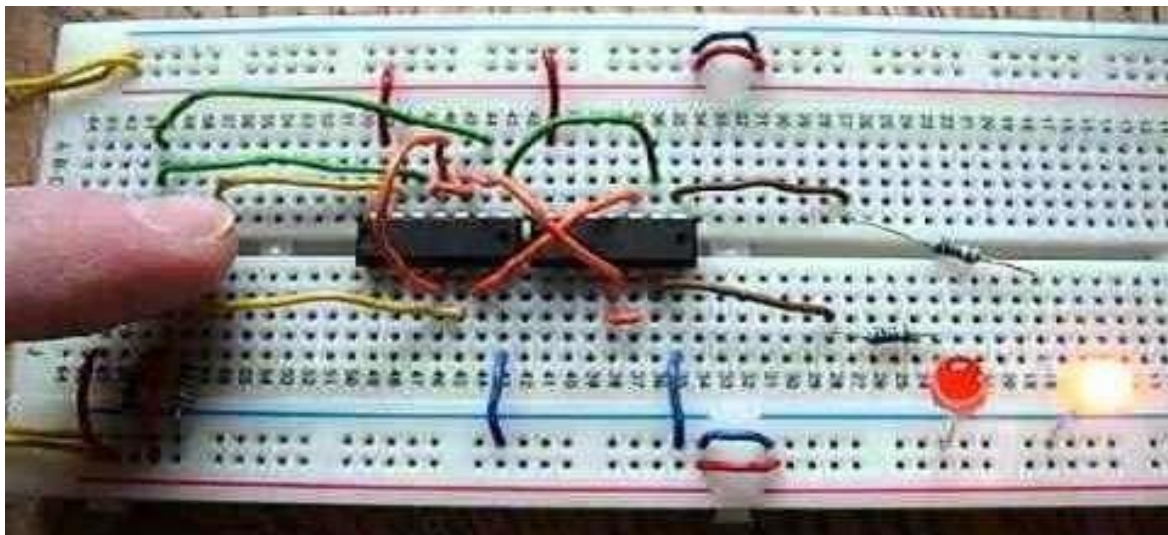
Procedure

- Test the IC's using IC tester.
- Mount IC's on breadboard.
- Understand working of all the circuit.
- Set up half subtractor and full subtractor circuit and feed all the input combinations
- Observe the outputs corresponding to input combinations on LEDs.
- Fill up the observation table.
- The supply voltage to the IC's should not exceed +5V.

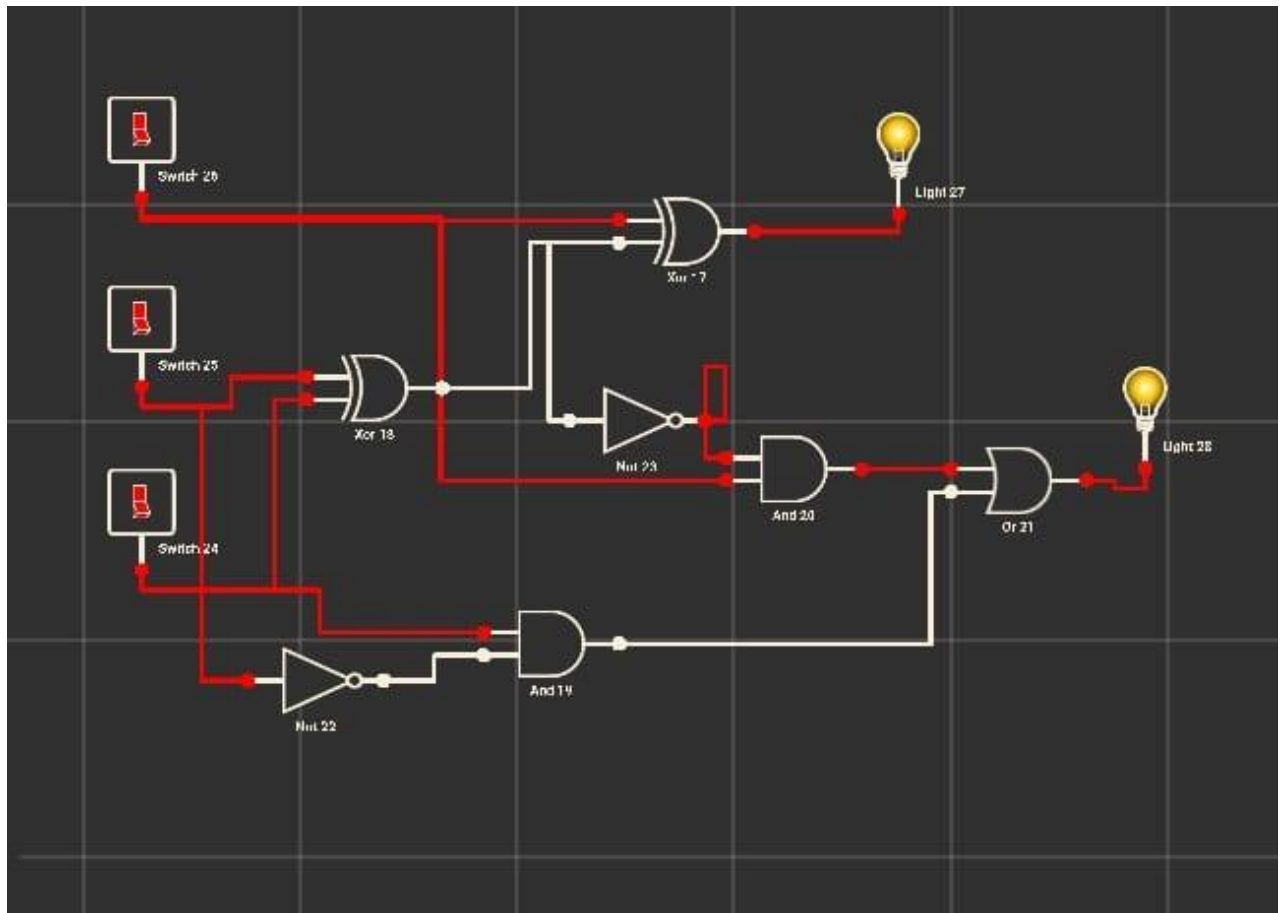
Half Subtractor Circuit Build on Circuit Simulator with Output:



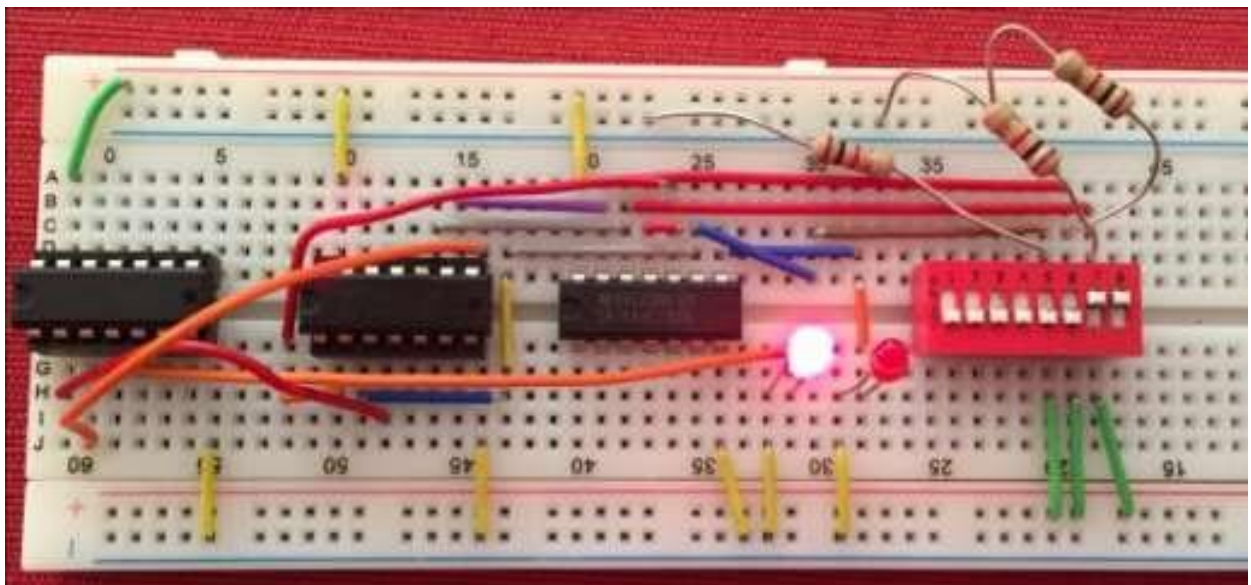
Practical Implementation:



Full Subtractor Circuit Build on Circuit Simulator with Output:



Practical Implementation of Full Subtractor



Observations:

Half Subtractor Table

A	B	Q	B _{IN}
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

Full Subtractor Table

A	B	C _{N-1}	D	B
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1