EXPERIMENT NO. 1 DATE:

COMPONENTS OF A COMPUTER

AIM : To assemble a computer system.

1. **POWER SUPPLY**

A power supply converts Ac power from an outlet into Dc power for the computer.

2. **HEAT SINK FAN**

Forces air over the heat sink.

3. **VIDEO ADAPTER CARD**

Provides video capabilities.

4. **NIC**

Connects the computer to a network.

5. **WIRELESS NIC**

Connects the computer to a wireless network.

6. **OPTICAL DRIVE**

Reads digital video disks.

7. **FLOPPY DRIVE**

Reads and writes data to a floppy disk.

8. **HARD DISK DRIVE**

Reads and writes data to a fixed disk.

9. **SATA CABLE**

Connects SATA drive to the motherboard.

10. **MOTHERBOARD**

The main printed circuit board in a computer.

11. **PATA CABLE**

Connects drives to the motherboard.

12. RAM

Temporaray memory used by the CPU.

EXPERIMENT NO. 2 DATE:

ASSEMBLING OF A COMPUTER SYSTEM

AIM : To assemble a computer system.

PROCEDURE :

- The assembling of the computer system is exactly the opposite of disassembling operation. Before starting assembling the computer system, make sure you have the screws and a screwdriver for those.
- The first step for assembling the computer system starts with mounting the processor on the processor socket of the motherboard. To mount the process, you don't need to apply any force. The special ZIF (zero insertion force) sockets are usually used to prevent any damage to the processor pins. Once the processor is mounted, the heat sink will be attached on top of the processor. The CPU fan is also attached on top of the heat sink.
- Now the motherboard is to be fixed vertically in the tower case and the screws are fixed from behind of the motherboard.
- Now line up the power supply at the top back end of the cabinet and screw it. The power connectors for motherboard power supply and CPU fan power supply are to be connected. If the cabinet cooling FAN is required then it is to be screwed at the back end grill of the cabinet and its power connector is to be connected from SMPS.
- Install the CD/DVD drives at the top front end of the cabinet and screw it. Install the Hard disk drive and floppy disk drive below CD/DVD drive and screw it. Make sure once screwed there is no vibration in either of the CD/DVD, Hard disk or Floppy disk drives.
- Now select the appropriate data cable and connect one end of the cable to its drive socket and another end at its appropriate connector on the motherboard. For SATA hard disk drive or CD/DVD drives use SATA cable and its power cable, else use IDE data cable. Do the proper jumper settings as per the usage requirement.
- It is time now to mount the memory modules on the motherboard by aligning the RAM to its socket on the motherboard and press it downward. Make sure the side tab are fixed into the RAM notch. If not, you may still have to press a bit.

- Install the internal cards to its socket and attach the cables or power cable to it. The selection of right socket or slot is required as per the type of socket.
- Cover the tower by placing it and pressing towards front side and screw it.
- Connect the external devices with CPU at its appropriate socket. It includes mouse and keyboard at PS2 or USB connectors. Monitor at the video output socket. Connect the power cable to the back of tower in SMPS. Plug in the power cable to the electric board.

RESULT : The computer system was successfully assembled.

EXPERIMENT NO. 3 DATE:

DISASSEMBLING OF A COMPUTER SYSTEM

AIM : To disassemble a computer system.

PROCEDURE :

- **Detach the power cable:**

The disassembling of the computer system starts with externally connected device detachment. Make sure the computer system is turned off, if not then successfully shut down the system and then start detaching the external devices from the computer system. It includes removing the power cable from electricity switchboard, then remove the cable from SMPS (switch mode power supply) from the back of the CPU Cabinet. Do not start the disassembling without detaching the power cable from the computer system. Now remove the remaining external devices like keyboard, mouse, monitor, printer or scanner from the back of CPU cabinet.

- **Remove the Cover:**

The standard way of removing tower cases used to be to undo the screws on the back of the case, slide the cover back about an inch and lift it off. The screwdrivers as per the type of screw are required to do the task.

- **Remove the adapter cards:**

Make sure if the card has any cables or wires that might be attached and decide if it would be easier to remove them before or after you remove the card. Remove the screw if any, that holds the card in place. Grab the card by its edges, front and back, and gently rock it lengthwise to release it.

- **Remove the drives:**

Removing drives is easier. There can be possibly three types of drives present in your computer system, Hard disk drive, CD/DVD/Blue-ray drives, floppy disk drives (almost absolute now a day). They usually have a power connector and a data cable attached from the device to a controller card or a connector on the motherboard. CD/DVD/Blue Ray drive may have an analog cable connected to the sound card for direct audio output.

The power may be attached using one of two connectors, a Molex connector or a Berg connector for the drive. The Molex connector may require to be wiggled

slightly from side to side and apply gentle pressure outwards. The Berg connector may just pull out or it may have a small tab which has to be lifted with a screwdriver.

Now Pull data cables off from the drive as well as motherboard connector. The hard disk drive and CD/DVD drives have two types of data cables. IDE and SATA cables. The IDE cables need better care while being removed as it may cause the damage to drive connector pins. Gently wiggle the cable sideways and remove it. The SATA cables can be removed easily by pressing the tab and pulling the connector straight back.

Now remove the screws and slide the drive out the back of the bay.

- **Remove the memory module:**

Memory modules are mounted on the motherboard as the chips that can be damaged by manual force if applied improperly. Be careful and handle the chip only by the edges.

- **Remove the power supply:**

The power supply is attached into tower cabinet at the top back end of the tower. Make sure the power connector is detached from the switchboard. Start removing the power connector connected to motherboard including CPU fan power connector, cabinet fan, the front panel of cabinet power buttons and all the remaining drives if not detached yet.

Now remove the screws of SMPS from the back of the cabinet and the SMPS can be detached from the tower cabinet.

- **Remove the motherboard:**

Before removing all the connectors from the motherboard, make sure u memorize the connectors for assembling the computer if required, as that may require connecting the connectors at its place. Remove the screws from the back of the motherboard and you will be able to detach it from the cabinet. Now remove the CPU fan from the motherboard. The heat sink will be visible now which can be removed by the pulling the tab upward. Finally, the processor is visible now, which can be removed by the plastic tab which can be pulled back one stretching it side way.

RESULT : The computer system was successfully disassembled.

EXPERIMENT NO. 4a DATE:

ADDITION OF TWO 8-BIT NUMBERS

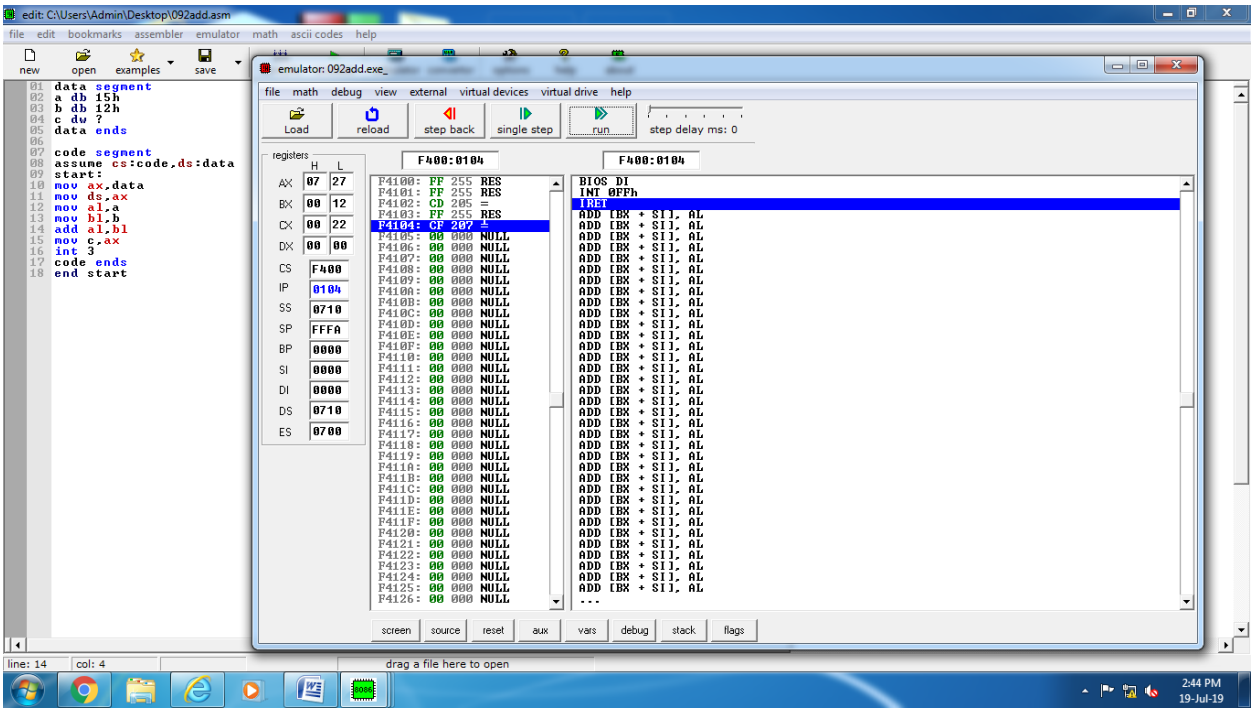
AIM : Adding two 8 Bit Numbers.

SOFTWARE USED : emu 8086

CODE :

```
data segment
a db 15h
b db 12h
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov al, a
mov bl, b
add al, bl
mov c, ax
int 3
code ends
end start
```

OUTPUT :



RESULT : Addition of two 8 bit numbers was successfully done.

EXPERIMENT NO. 4b DATE:

SUBTRACTION OF TWO 8-BIT NUMBERS

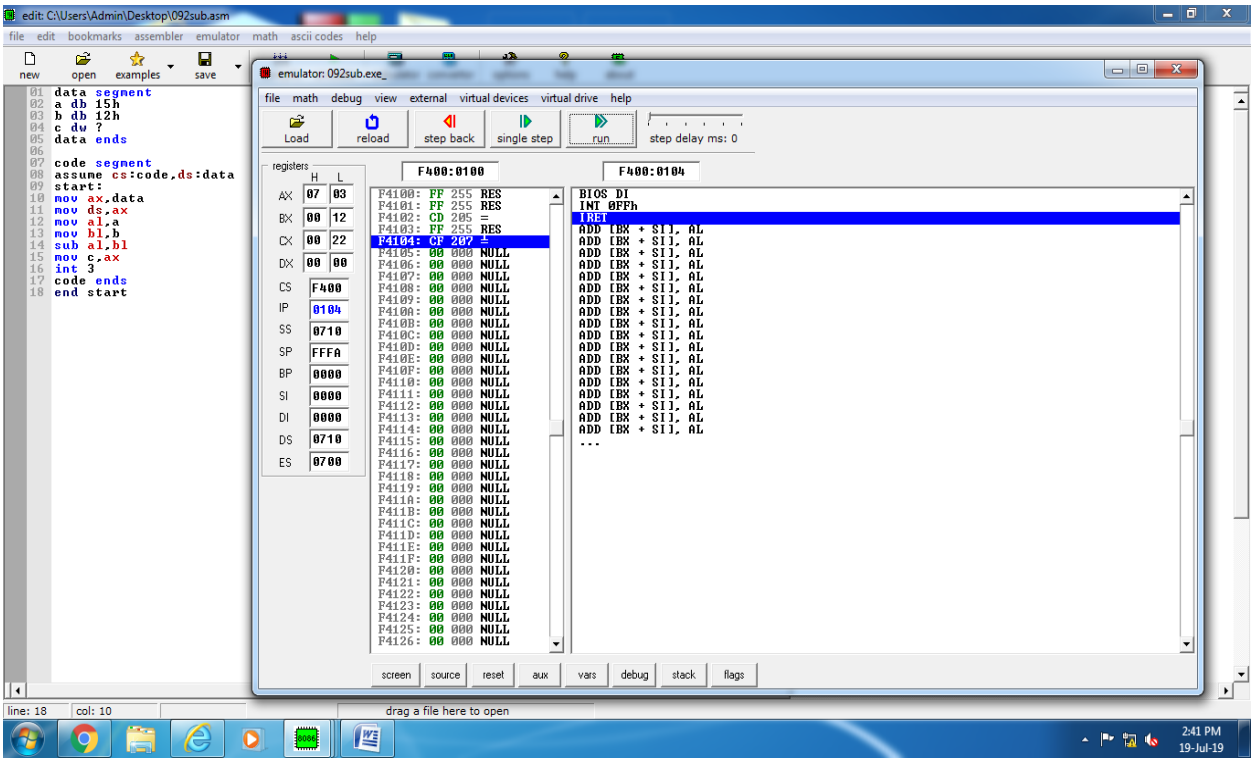
AIM : Subtracting two 8 Bit Numbers.

SOFTWARE USED : emu 8086

CODE :

```
data segment
a db 15h
b db 12h
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov al, a
mov bl, b
sub al, bl
mov c, ax
int 3
code ends
end start
```

OUTPUT :



RESULT : Subtraction of two 8 bit numbers was successfully done.

EXPERIMENT NO. 5a DATE:

ADDITION OF TWO 16-BIT NUMBERS

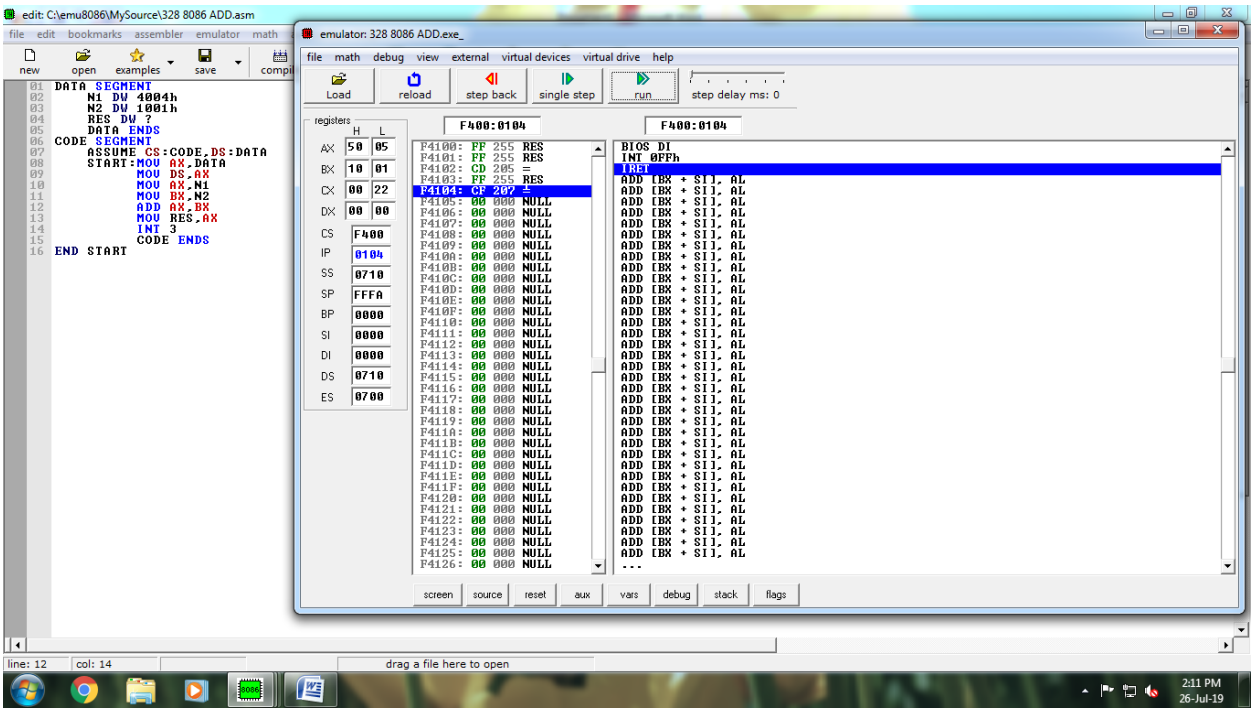
AIM : Adding two 16 Bit Numbers.

SOFTWARE USED : emu 8086

CODE :

```
data segment
N1 dw 4004h
N2 dw 1001h
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov ax, N1
mov bx, N2
add ax, bx
mov Res, ax
int 3
code ends
end start
```

OUTPUT :



RESULT : Addition of two 16 bit numbers was successfully done.

EXPERIMENT NO. 5b DATE:

SUBTRACTION OF TWO 16-BIT NUMBERS

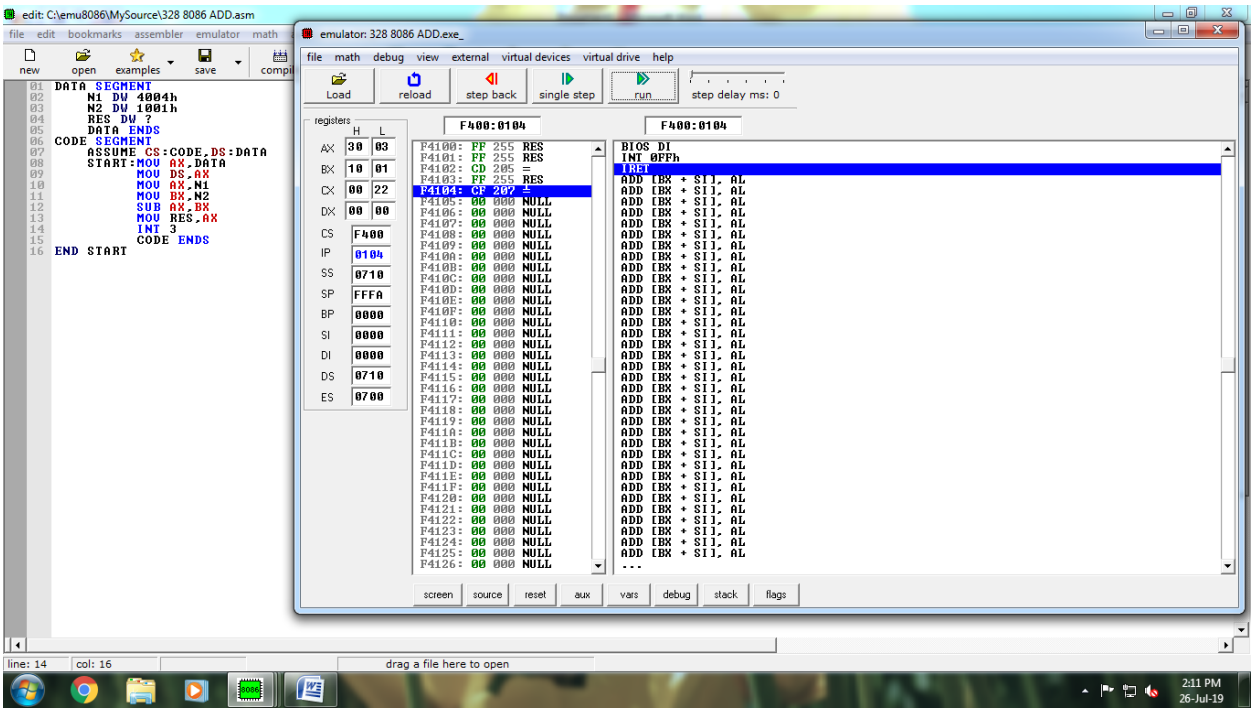
AIM : Subtracting two 16 Bit Numbers.

SOFTWARE USED : emu 8086

CODE :

```
data segment
N1 dw 4004h
N2 dw 1001h
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov ax, N1
mov bx, N2
sub ax, bx
mov Res, ax
int 3
code ends
end start
```

OUTPUT :



RESULT : Subtraction of two 16 bit numbers was successfully done.

EXPERIMENT NO. 6 DATE:

FACTORIAL OF A 8-BIT NUMBER

AIM : To find factorial of a 8 bit number.

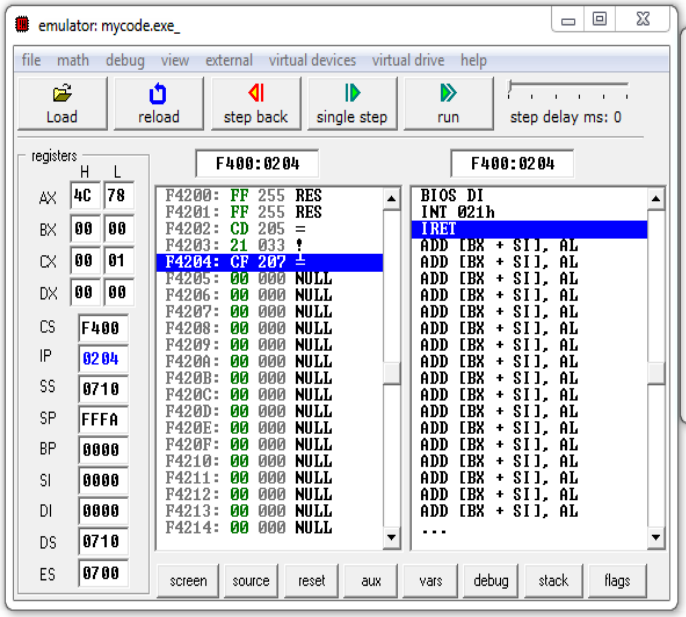
SOFTWARE USED : emu 8086

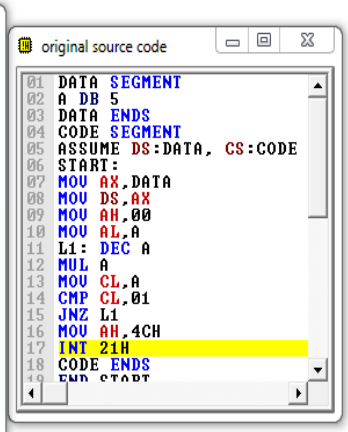
CODE :

```
data segment
A db 5
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov ah, 00
mov al, a
L1 : Dec a
Mul A
mov cl, a
cmp cl, 01
Jnz L1
Mov ah, 4ch
int 21H
code ends
end start
```

OUTPUT :

```
DATA SEGMENT
    A DB 5
    DATA ENDS
CODE SEGMENT
    ASSUME DS:DATA, CS:CODE
    START:
    MOV AX,DATA
    MOV DS,AX
    MOV AH,00
    MOV AL,A
    L1: DEC A
    MUL A
    MOV CL,A
    CMP CL,01
    JNZ L1
    MOV AH,4CH
    INT 21H
    CODE ENDS
END START
```





RESULT : Factorial of a 8 bit number has been found.

EXPERIMENT NO. 7 DATE:

MULTIPLICATION OF TWO 8-BIT NUMBERS

AIM : Multiplying two 8 bit numbers.

SOFTWARE USED : emu 8086

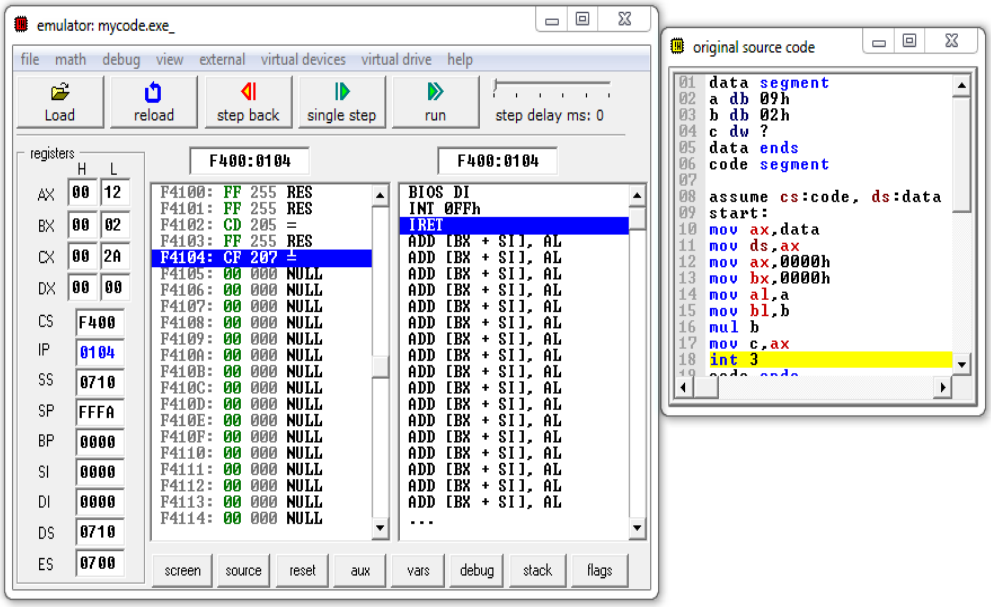
CODE :

```
data segment
A db 09h
B db 02h
Res1 dw ?
data ends
code segment
assume cs: code, ds: data
start:
mov ax, data
mov ds, ax
mov ax, 0000h
mov bx, 0000h
Mul b
mov Res1, ax
int 3
code ends
end start
```

OUTPUT :

```
data segment
    a db 09h
    b db 02h
    c dw ?
    data ends
code segment

    assume cs:code, ds:data
    start:
    mov ax,data
    mov ds,ax
    mov ax,0000h
    mov bx,0000h
    mov al,a
    mov bl,b
    mul b
    mov c,ax
    int 3
    code ends
end start
```



RESULT : Multiplication of two 8 bit numbers has been done.

EXPERIMENT NO. 8 DATE:

FULL ADDER CIRCUIT

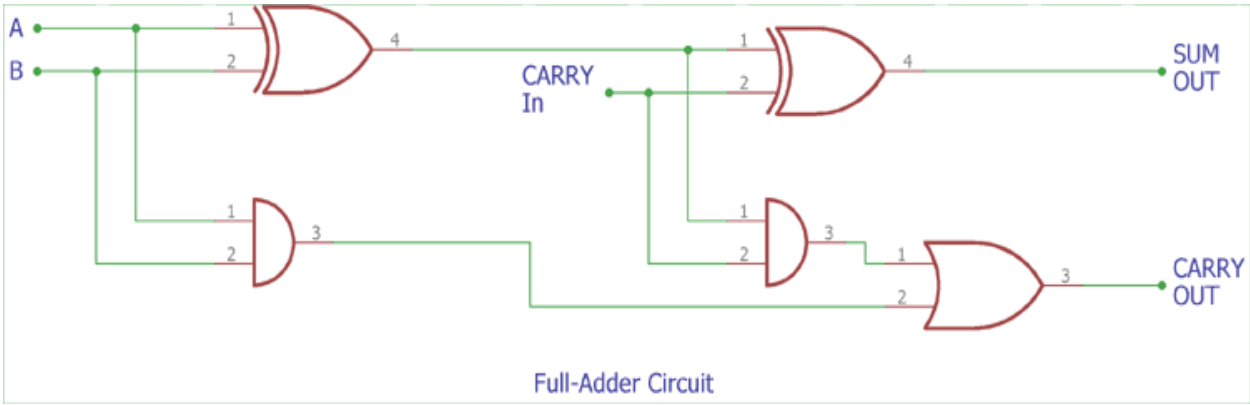
AIM : To design and implement a full adder circuit.

SOFTWARE USED : Logic gate simulator

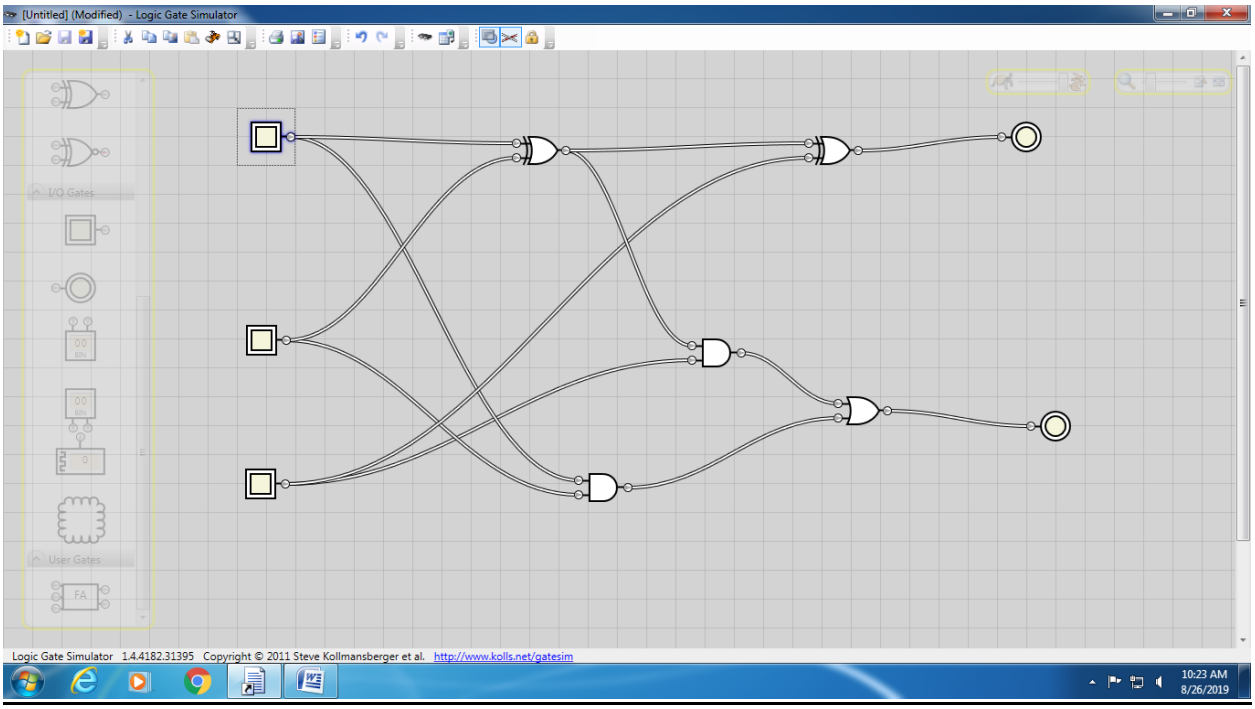
TRUTH TABLE :

INPUTS			OUTPUT	
A	B	C-IN	C-OUT	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

CIRCUIT DIAGRAM :



OUTPUT :


[Untitled] (Modified) - Logic Gate Simulator
I/O Gates
User Gates
FA
Logic Gate Simulator 1.4.4182.31395 Copyright © 2011 Steve Kollmansberger et al. http://www.kolls.net/gatesim
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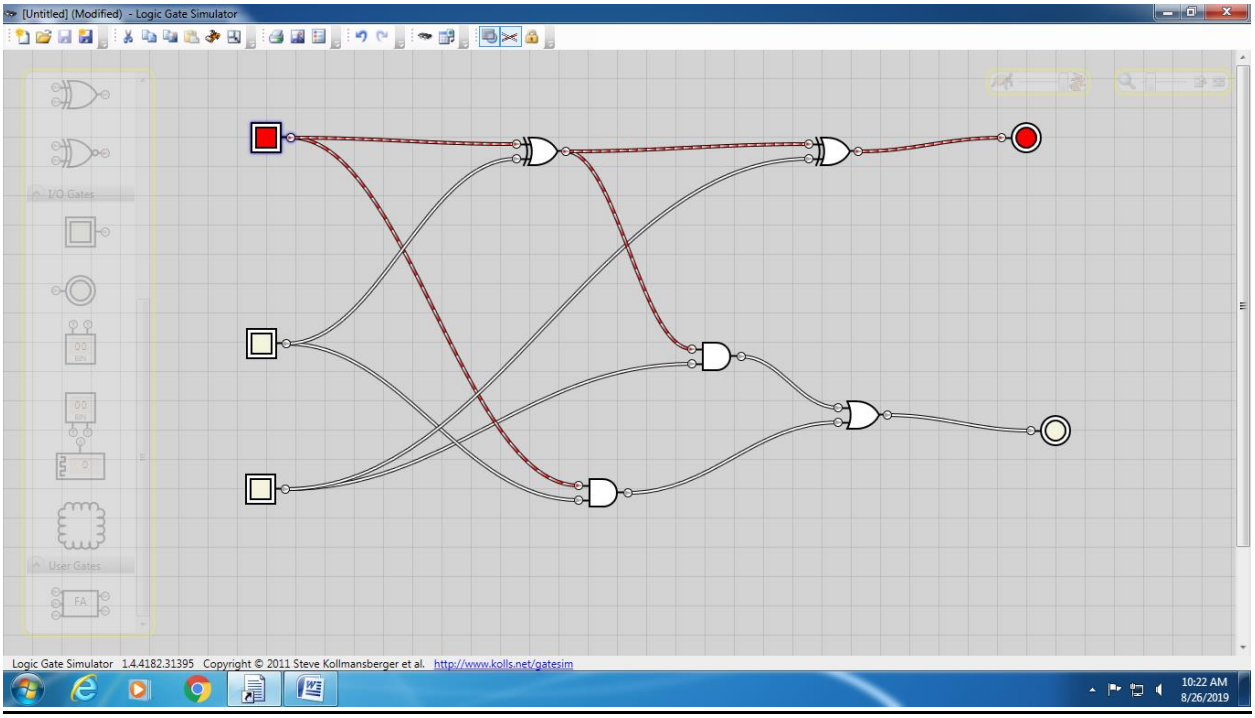
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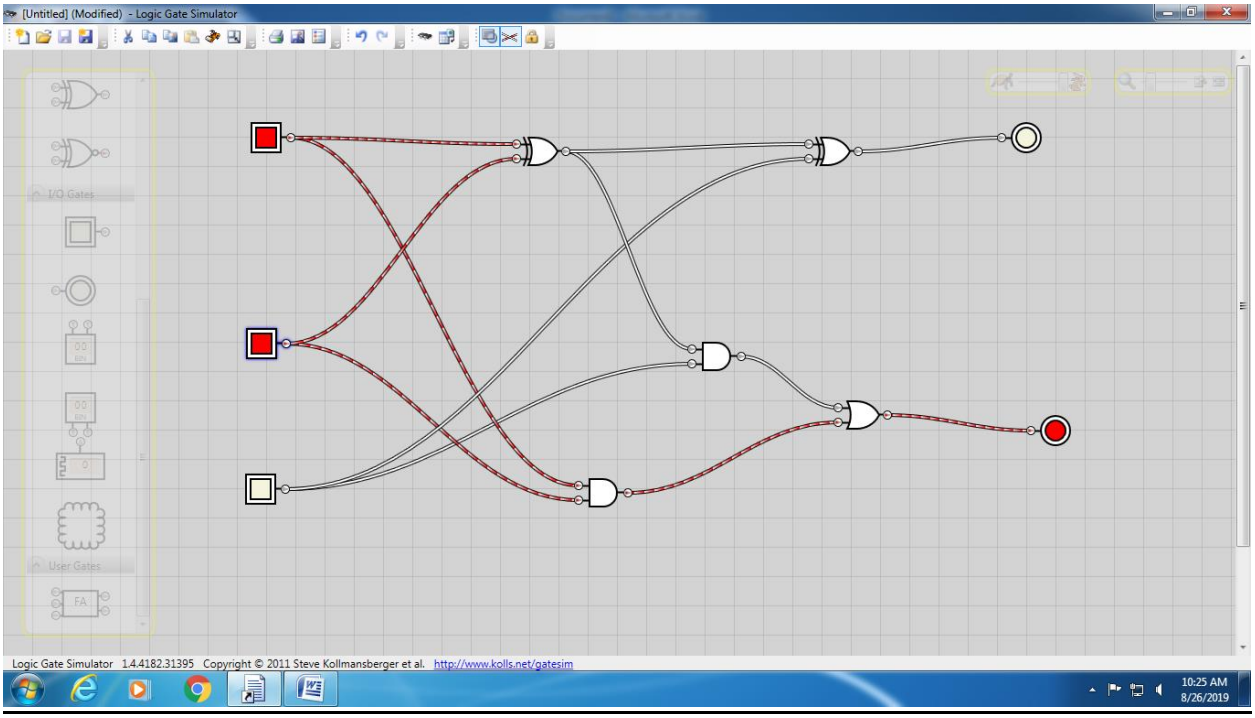
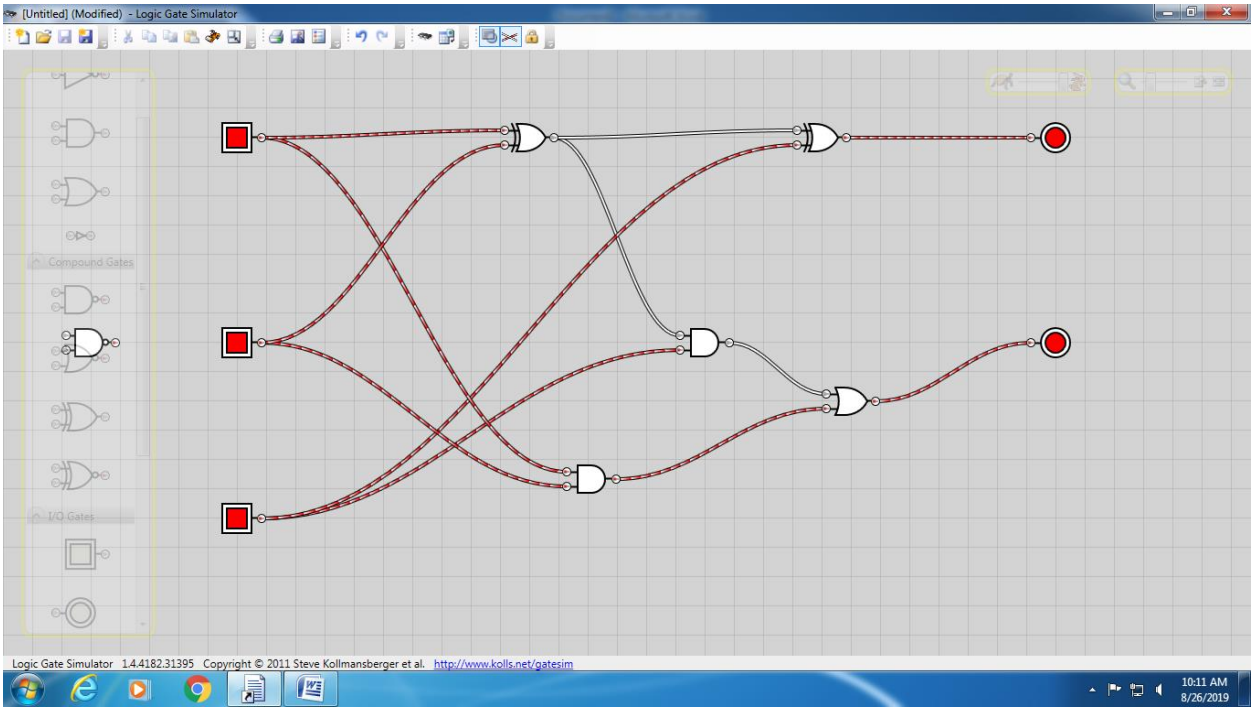




RESULT : Here, we add three one bit binary numbers, two operands & a carry bit.

EXPERIMENT NO. 9 DATE:

HALF ADDER CIRCUIT

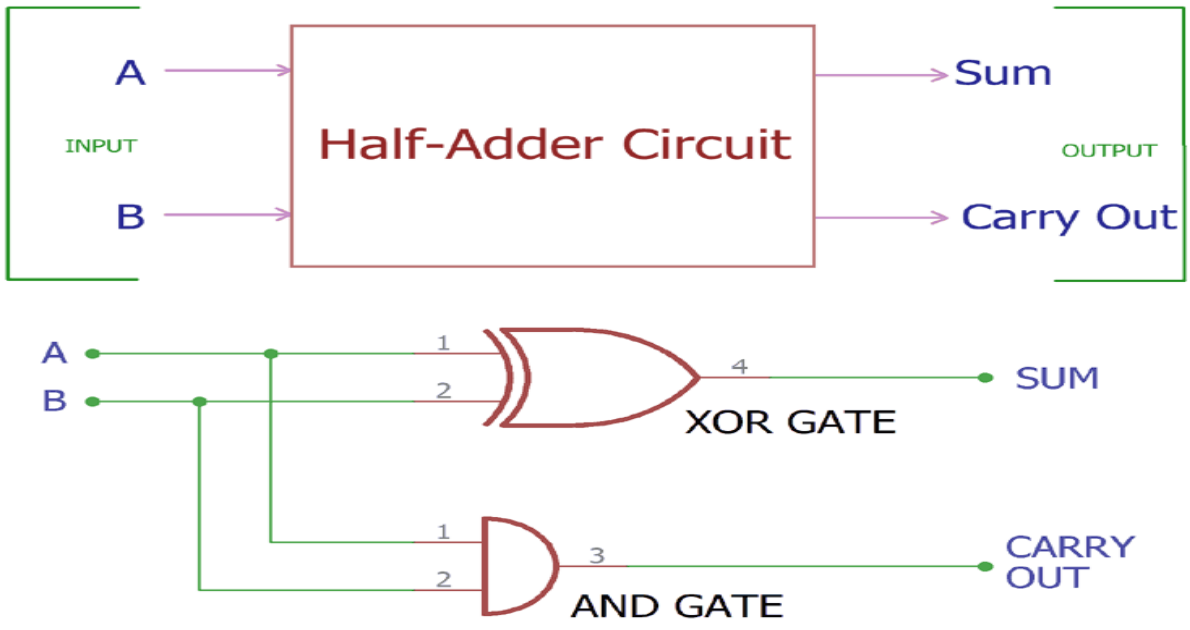
AIM : To design and implement a half adder circuit.

SOFTWARE USED : Logic gate simulator

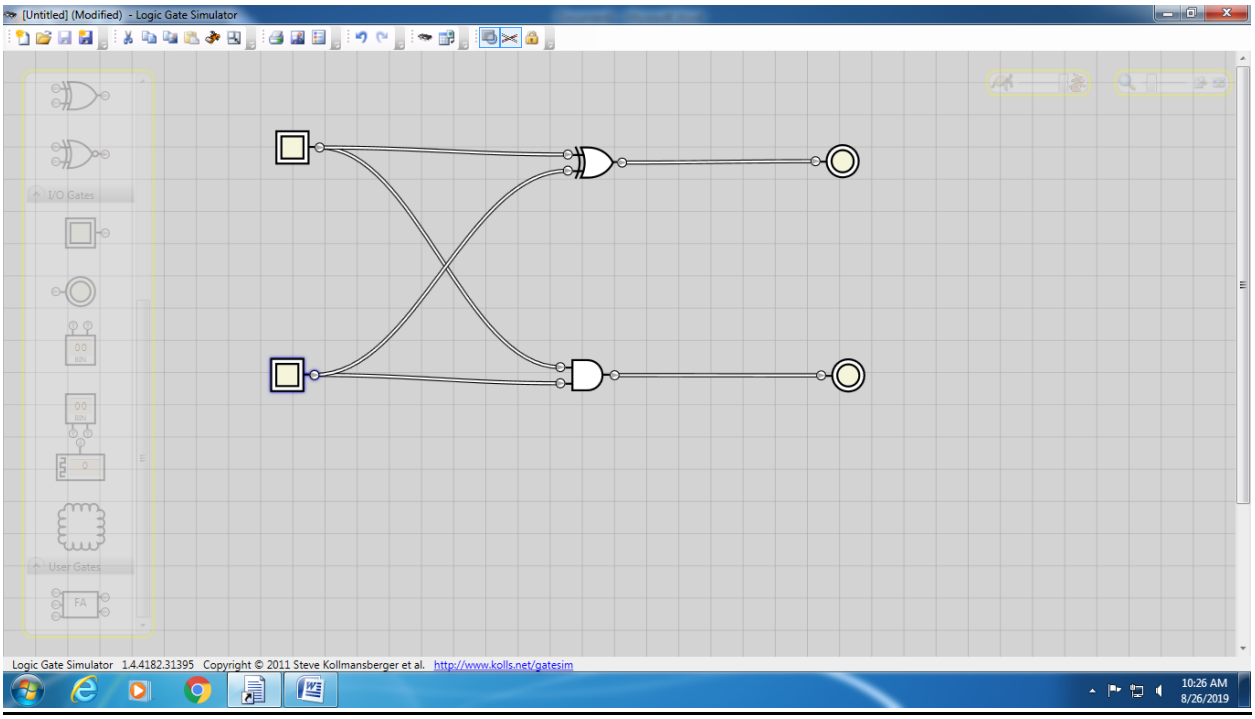
TRUTH TABLE :

INPUTS		OUTPUTS	
A	B	SUM	CARRY
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

CIRCUIT DIAGRAM :



OUTPUT :


[Untitled] (Modified) - Logic Gate Simulator
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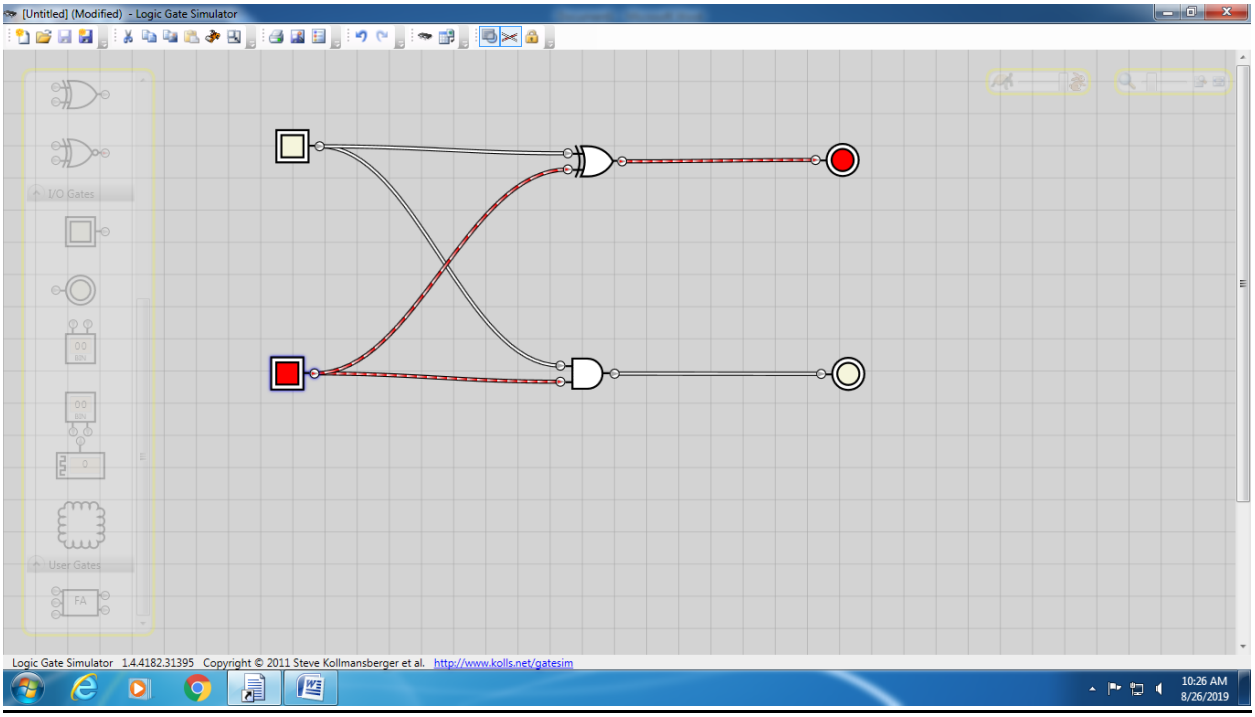
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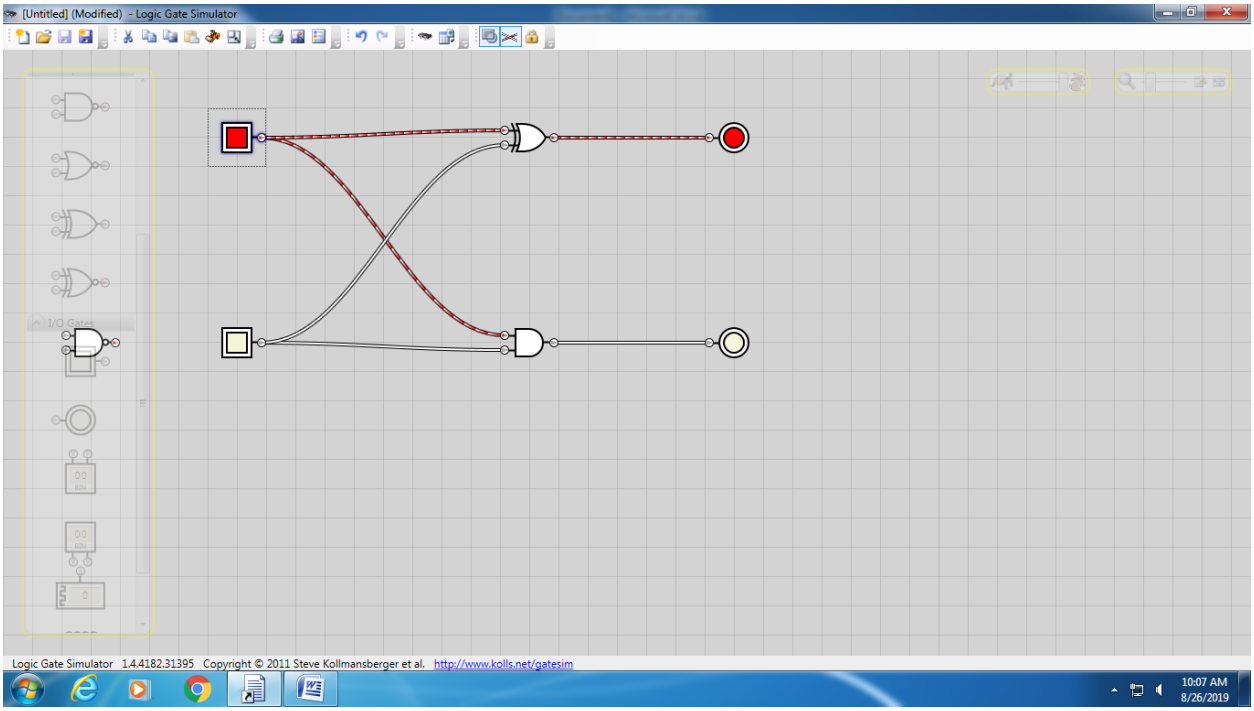
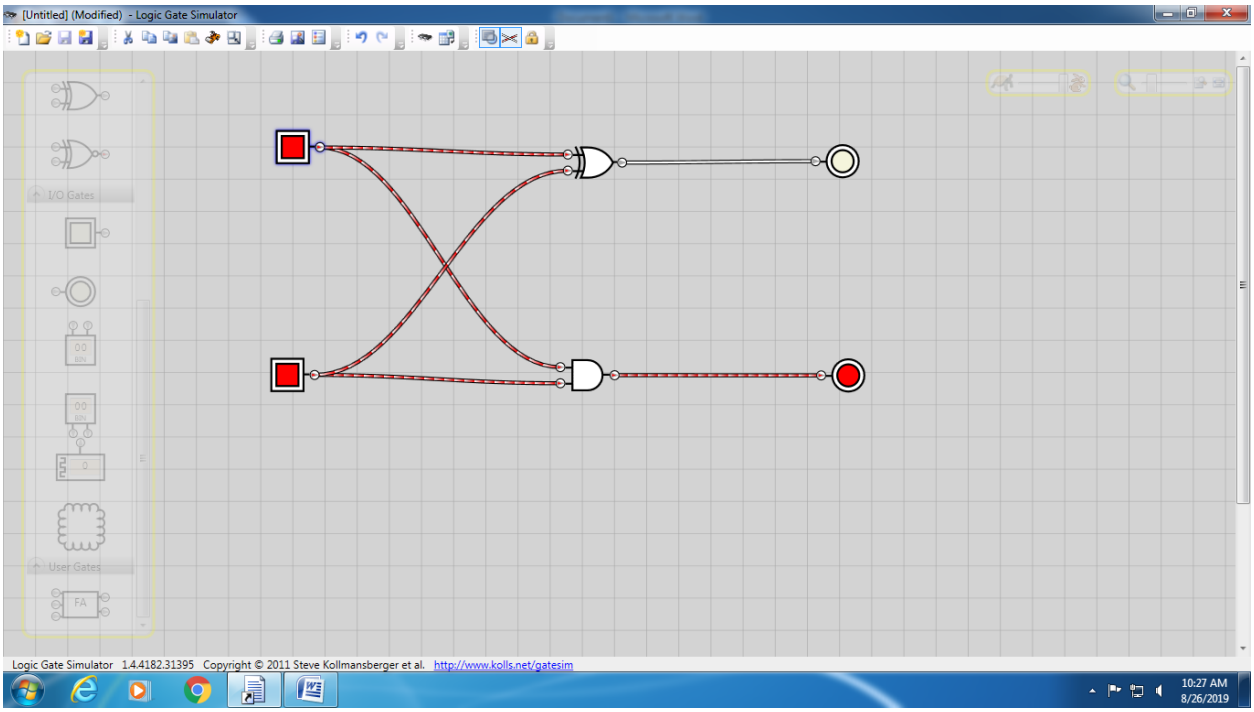
8/26/2019





RESULT : Here, we add two single digit binary numbers & results in two digit out.

EXPERIMENT NO. 10 DATE:

RIPPLE CARRY ADDER

AIM : To design and implement a ripple carry adder.

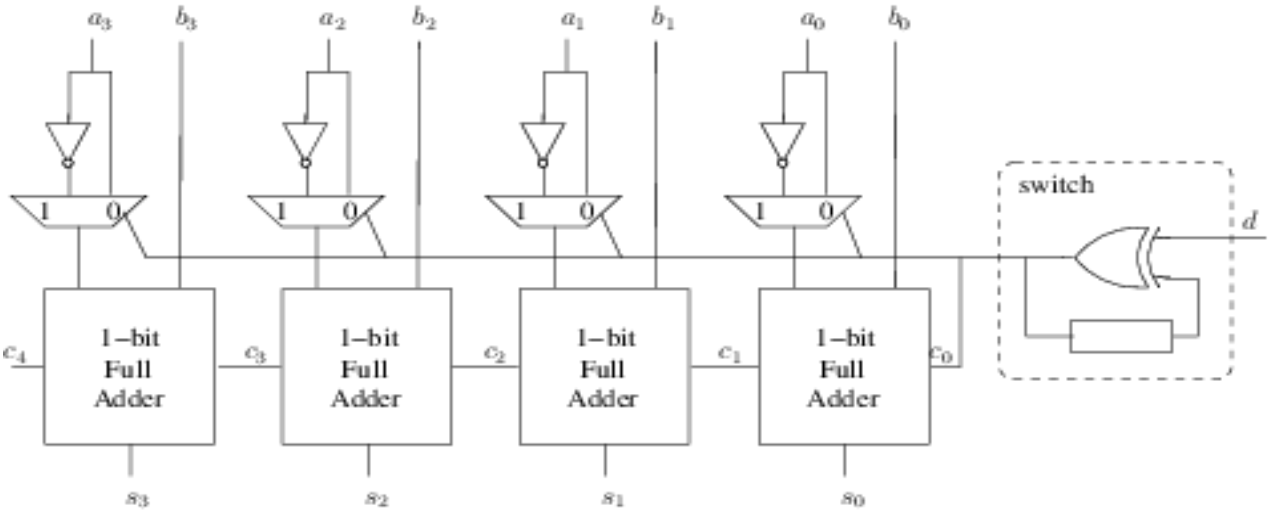
SOFTWARE USED : Logic gate simulator

TRUTH TABLE :

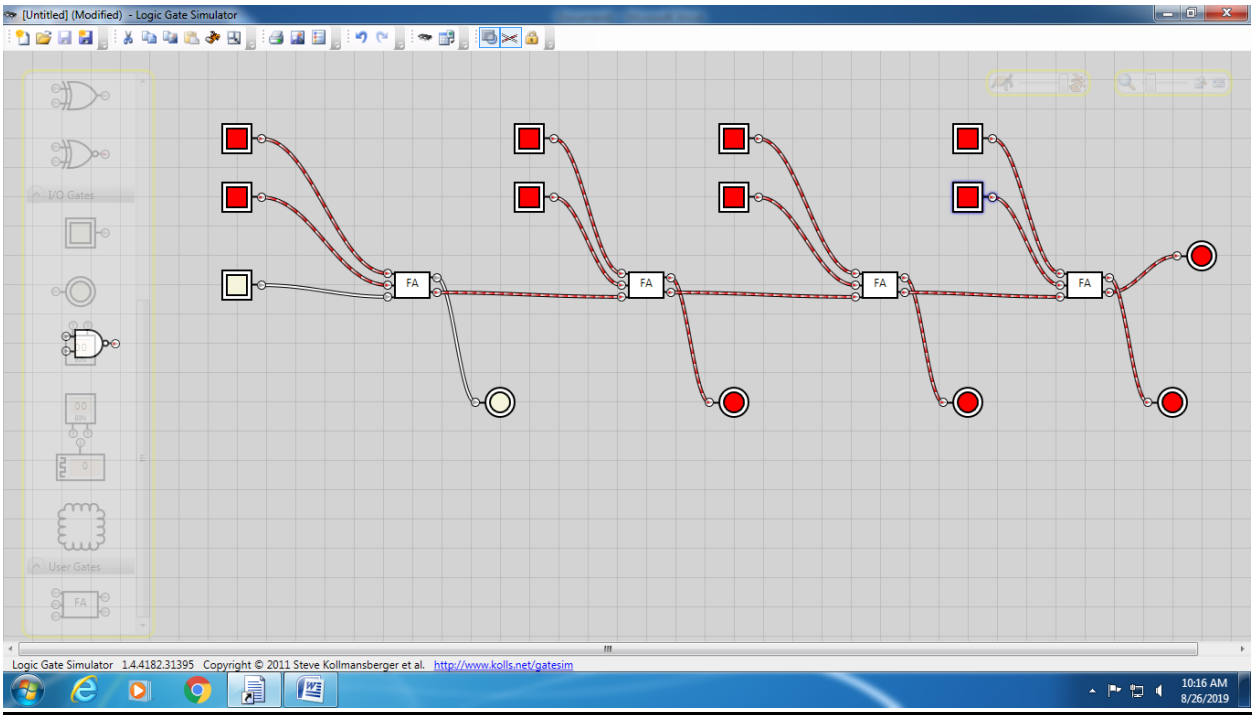
Truth table of ripple carry adder

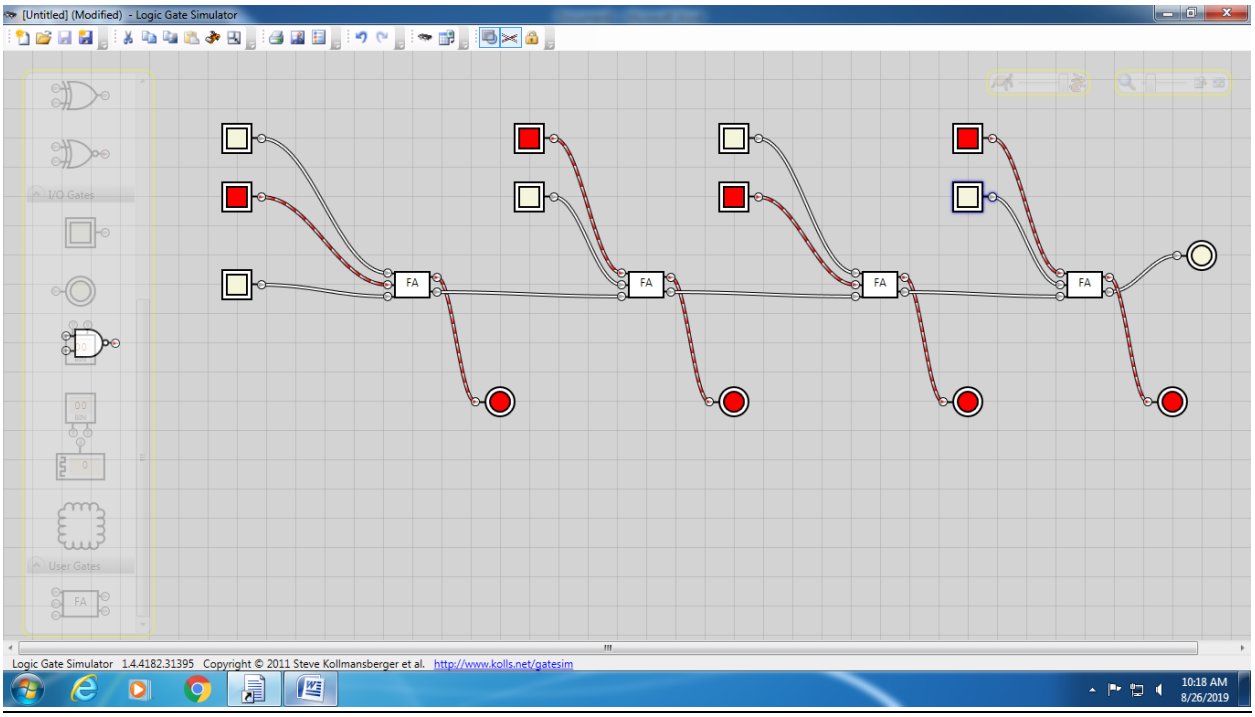
A1	A2	A3	A4	B4	B3	B2	B1	S4	S3	S2	S1	carry
0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	1	0	0	1	0	0	0	0
1	0	0	0	1	0	0	0	0	0	0	0	1
1	0	1	0	1	0	1	0	0	1	0	0	1
1	1	0	0	1	1	0	0	1	0	0	0	1
1	1	1	0	1	1	1	0	1	1	0	0	1
1	1	1	1	1	1	1	1	1	1	1	0	1

CIRCUIT DIAGRAM :



OUTPUT :





RESULT : Hence, ripple carry adder was constructed in the simulator & it's characteristics were studied.

EXPERIMENT NO. 11 DATE:

CARRY LOOK AHEAD ADDER

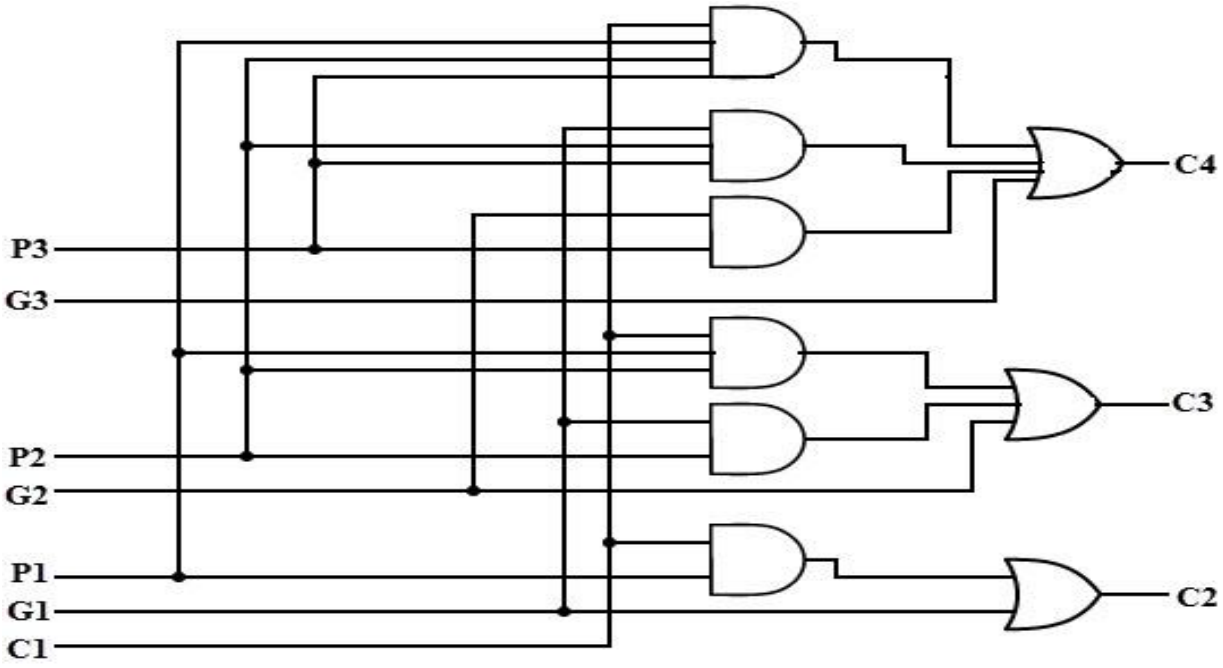
AIM : To design and implement a carry look ahead adder.

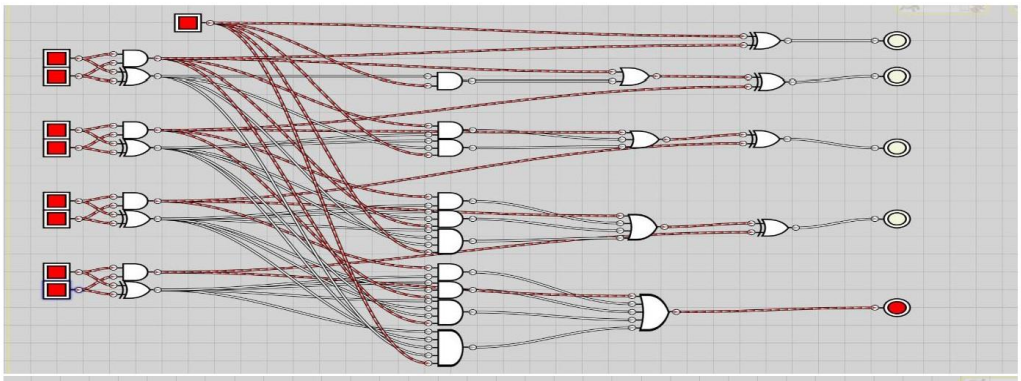
SOFTWARE USED : Logic gate simulator

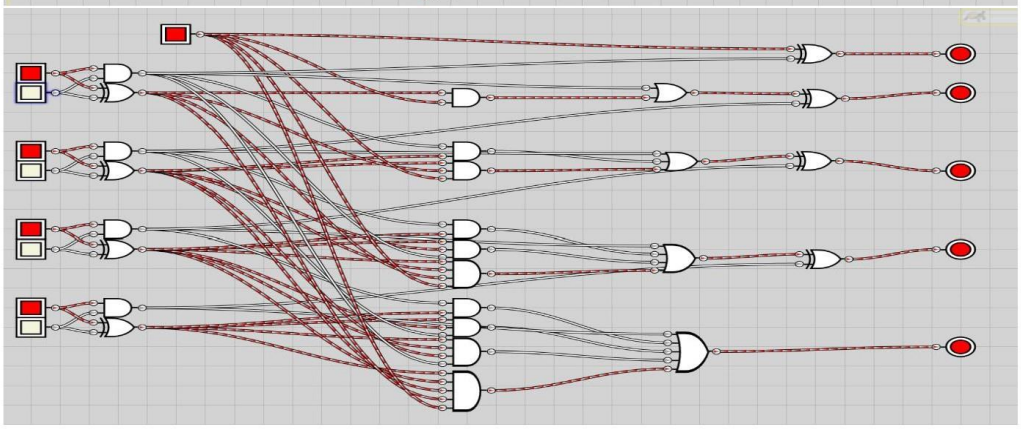
TRUTH TABLE :

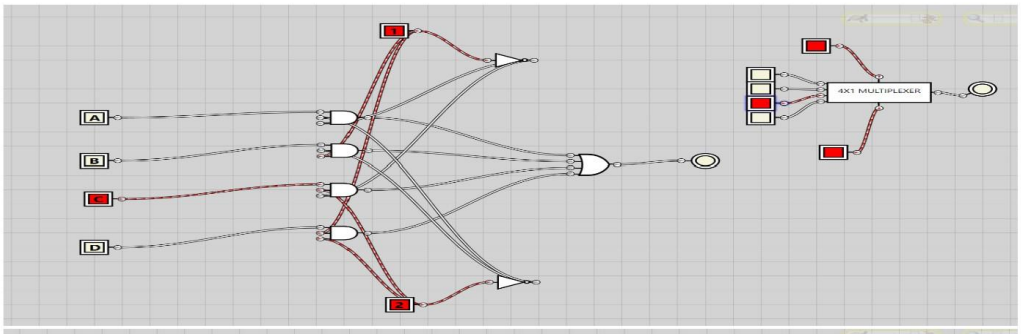
A	B	Ci	C i +1	Condition
0	0	0	0	No carry generate
0	0	1	0	
0	1	0	0	
0	1	1	1	No carry propagate
1	0	0	0	
1	0	1	1	
1	1	0	1	Carry generate
1	1	1	1	

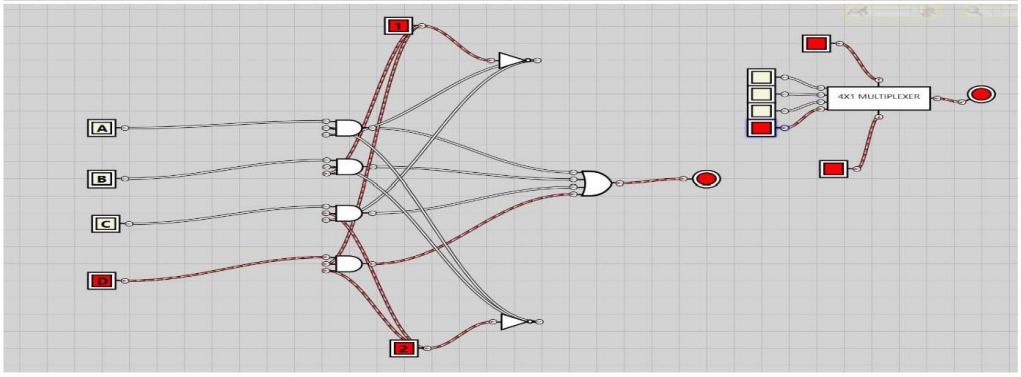
CIRCUIT DIAGRAM :











RESULT : Hence, carry look ahead adder was constructed & char. were studied.

EXPERIMENT NO. 12 DATE:

2-BIT MULTIPLIER

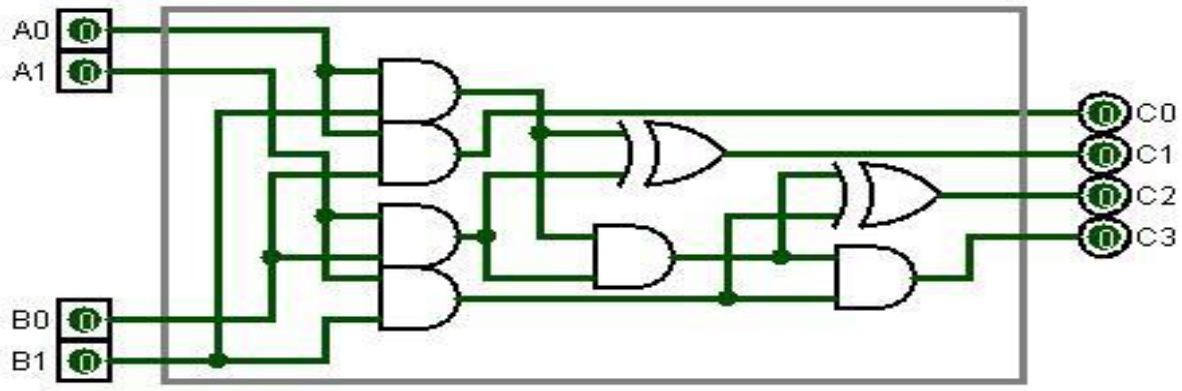
AIM : To design and implement a carry look ahead adder.

SOFTWARE USED : Logic gate simulator

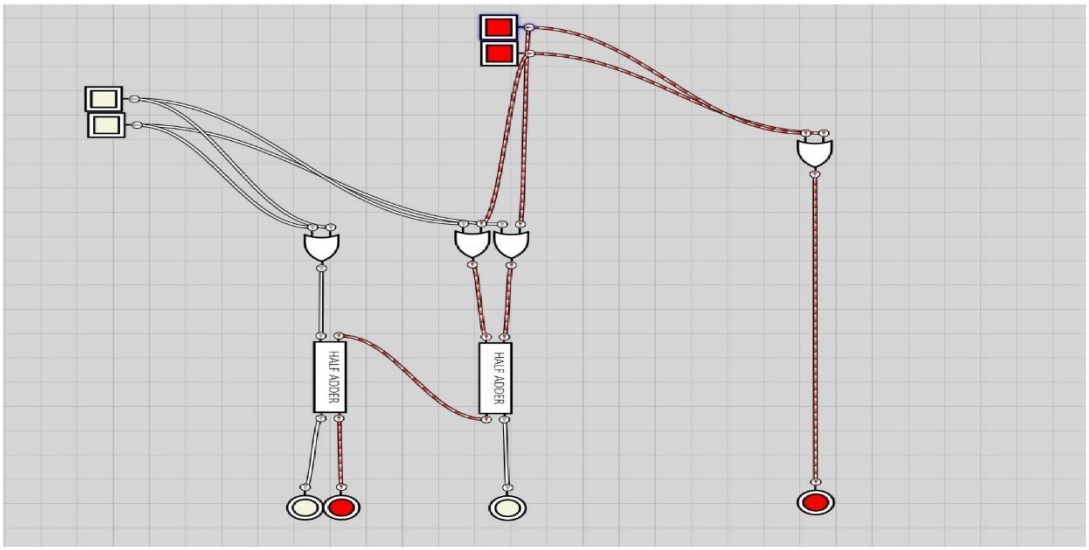
TRUTH TABLE :

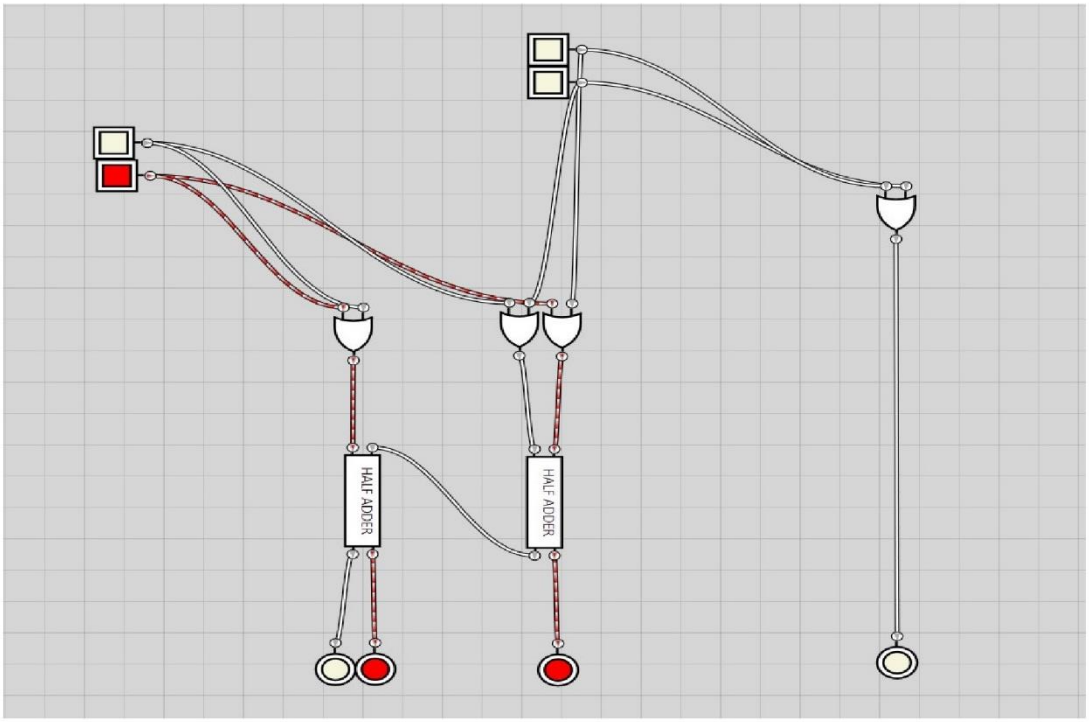
	Inputs				Outputs				
	A	B	C	D	W	X	Y	Z	
0×0	0	0	0	0	0	0	0	0	0
0×1	0	0	0	1	0	0	0	0	0
0×2	0	0	1	0	0	0	0	0	0
0×3	0	0	1	1	0	0	0	0	0
1×0	0	1	0	0	0	0	0	0	0
1×1	0	1	0	1	0	0	0	1	1
1×2	0	1	1	0	0	0	1	0	2
1×3	0	1	1	1	0	0	1	1	3
2×0	1	0	0	0	0	0	0	0	0
2×1	1	0	0	1	0	0	1	0	2
2×2	1	0	1	0	0	1	0	0	4
2×3	1	0	1	1	0	1	1	0	6
3×0	1	1	0	0	0	0	0	0	0
3×1	1	1	0	1	0	0	1	1	3
3×2	1	1	1	0	0	1	1	0	6
3×3	1	1	1	1	1	0	0	1	9

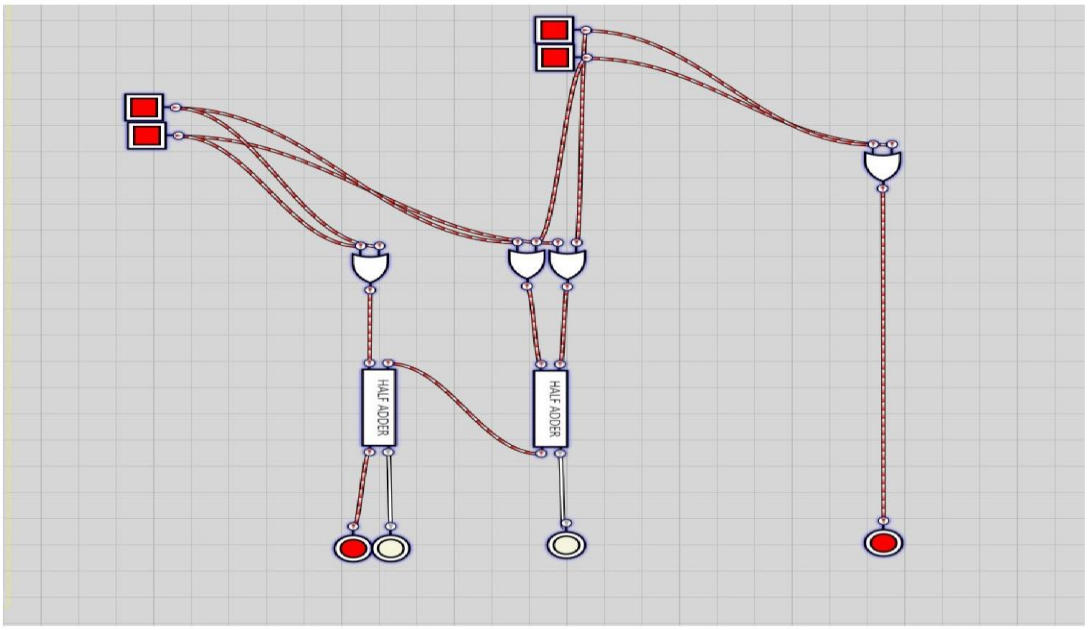
CIRCUIT DIAGRAM :

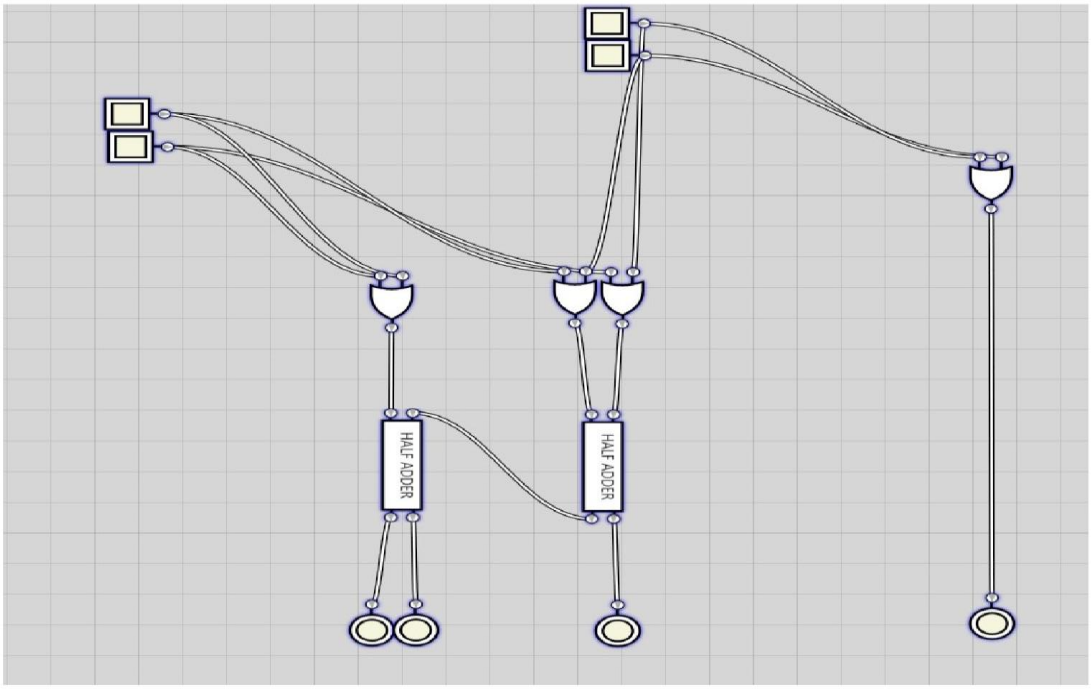


OUTPUT :









RESULT : 2- bit binary multiplier was constructed & studied.

EXPERIMENT NO. 13 DATE:

BINARY PARALLEL ADDER & SUBTRACTOR

AIM : To design and implement a binary parallel adder & subtractor.

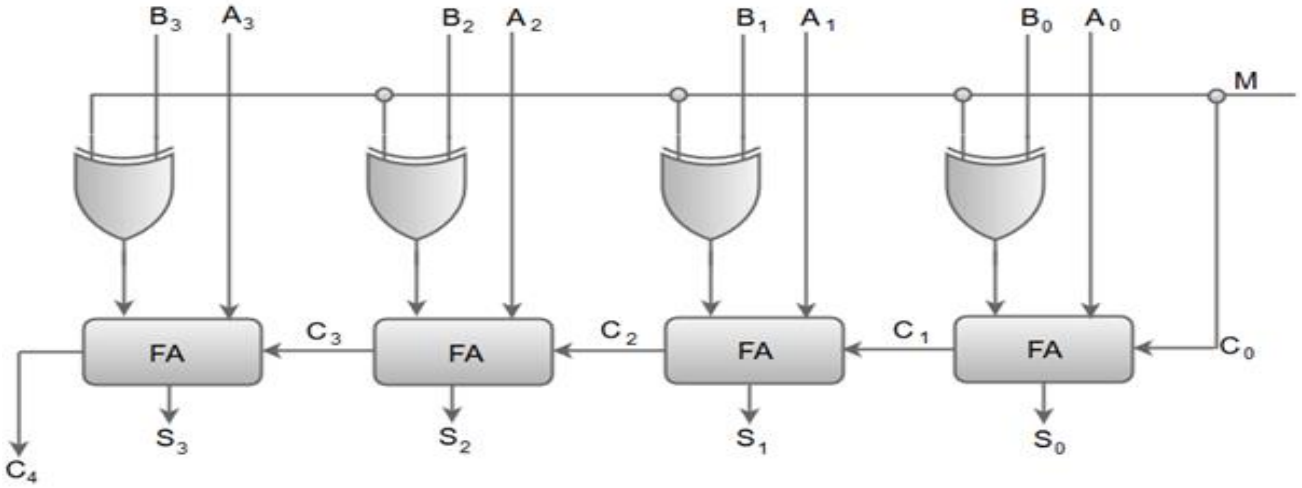
SOFTWARE USED : Logic gate simulator

TRUTH TABLE :

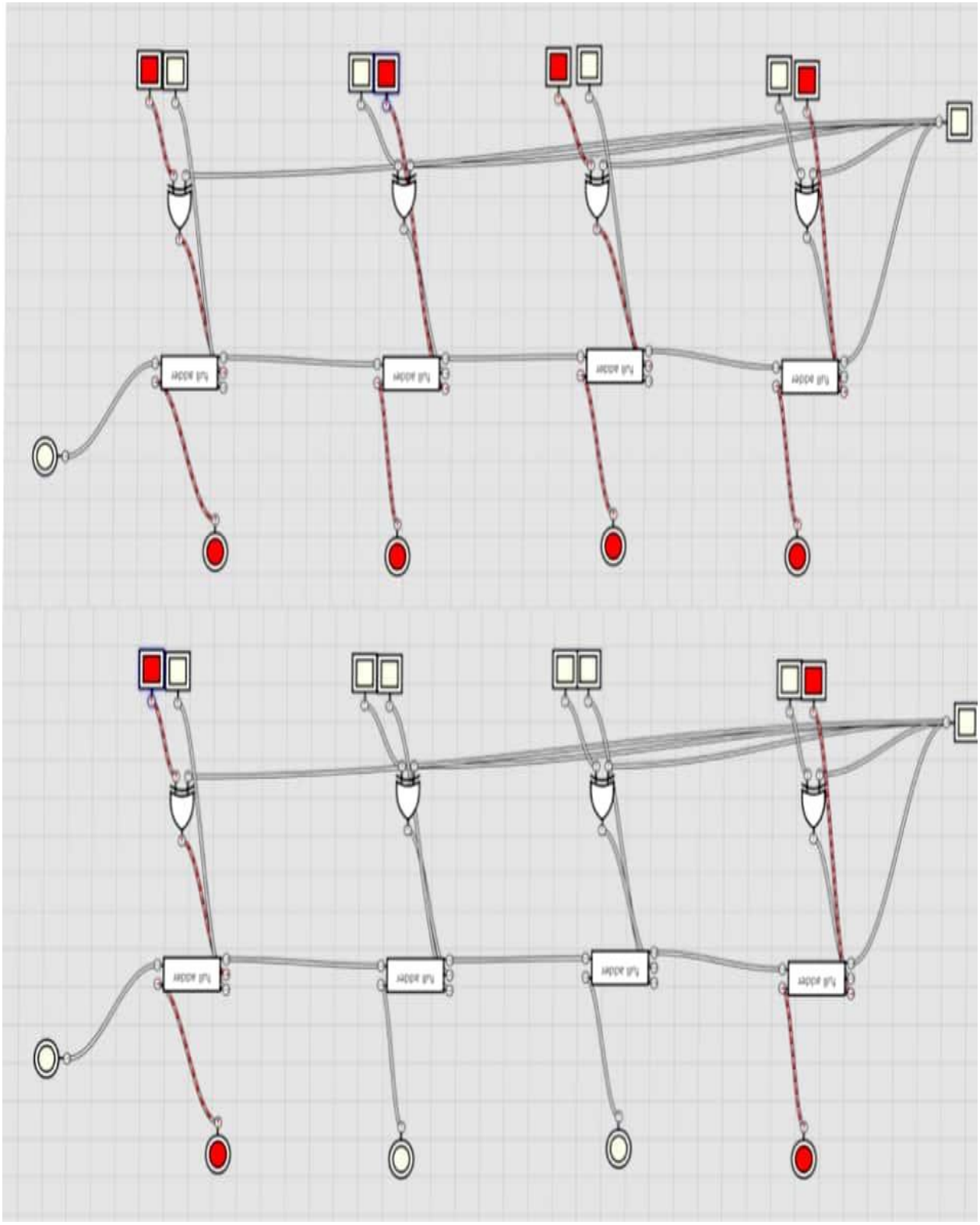
	B3	B2	B1	B0	M	X3	X2	X1	X0
Addition	0	0	0	0	**0**	0	0	0	0
	0	0	0	1	**0**	0	0	0	1
	0	0	1	0	**0**	0	0	1	0
	0	0	1	1	**0**	0	0	1	1
	0	1	0	0	**0**	0	1	0	0
	0	1	0	1	**0**	0	1	0	1
	0	1	1	0	**0**	0	1	1	0
	0	1	1	1	**0**	0	1	1	1
	1	0	0	0	**0**	1	0	0	0
	1	0	0	1	**0**	1	0	0	1
Subs traction	0	0	0	0	**1**	1	0	0	1
	0	0	0	1	**1**	1	0	0	0
	0	0	1	0	**1**	0	1	1	1
	0	0	1	1	**1**	0	1	1	0
	0	1	0	0	**1**	0	1	0	1
	0	1	0	1	**1**	0	1	0	0
	0	1	1	0	**1**	0	0	1	1
	0	1	1	1	**1**	0	0	1	0
	1	0	0	0	**1**	0	0	0	1
	1	0	0	1	**1**	0	0	0	0

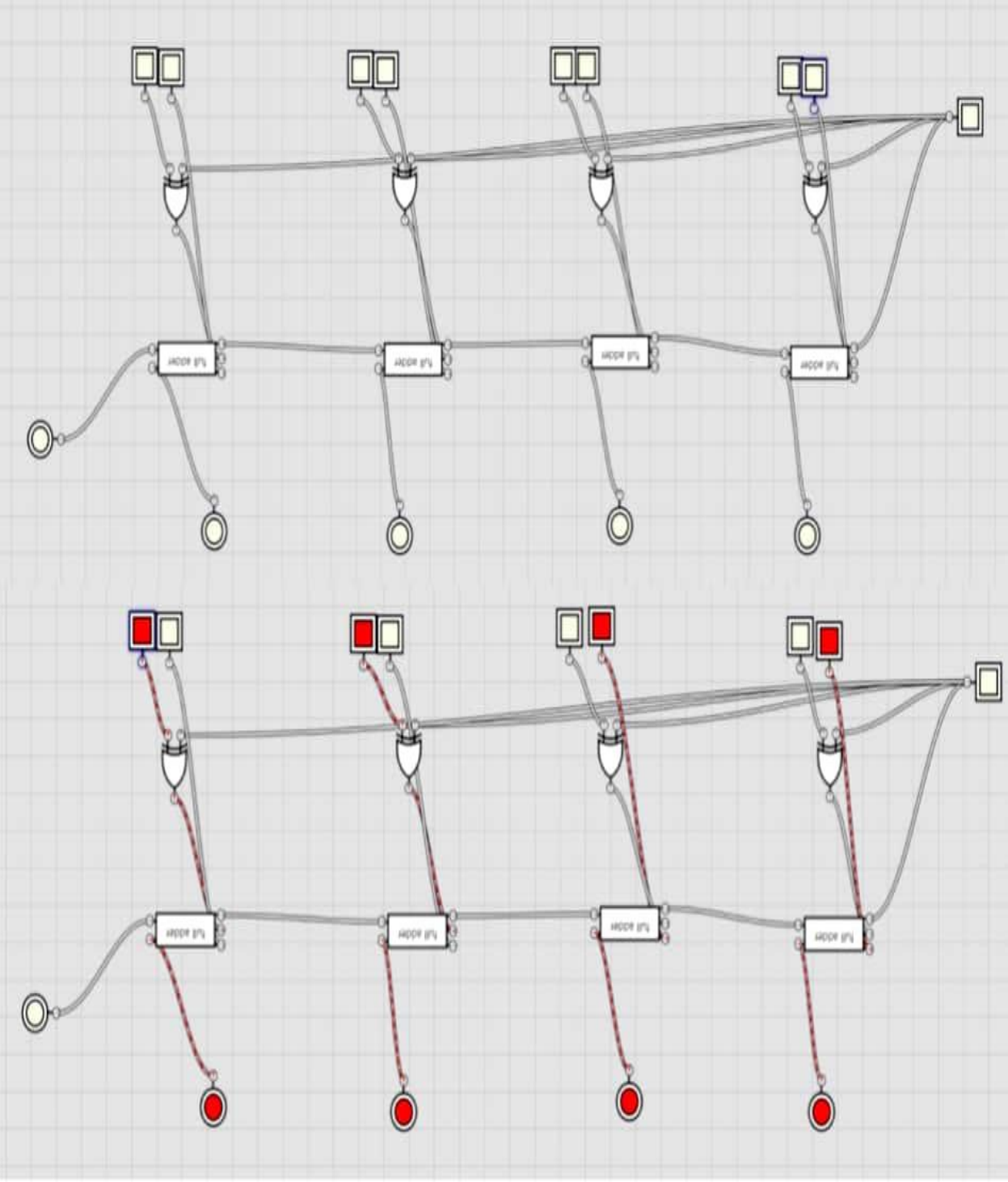
CIRCUIT DIAGRAM :

4 bit adder-subtractor:



OUTPUT :





RESULT : Binary parallel adder & subtractor was constructed & it's char. was studied.

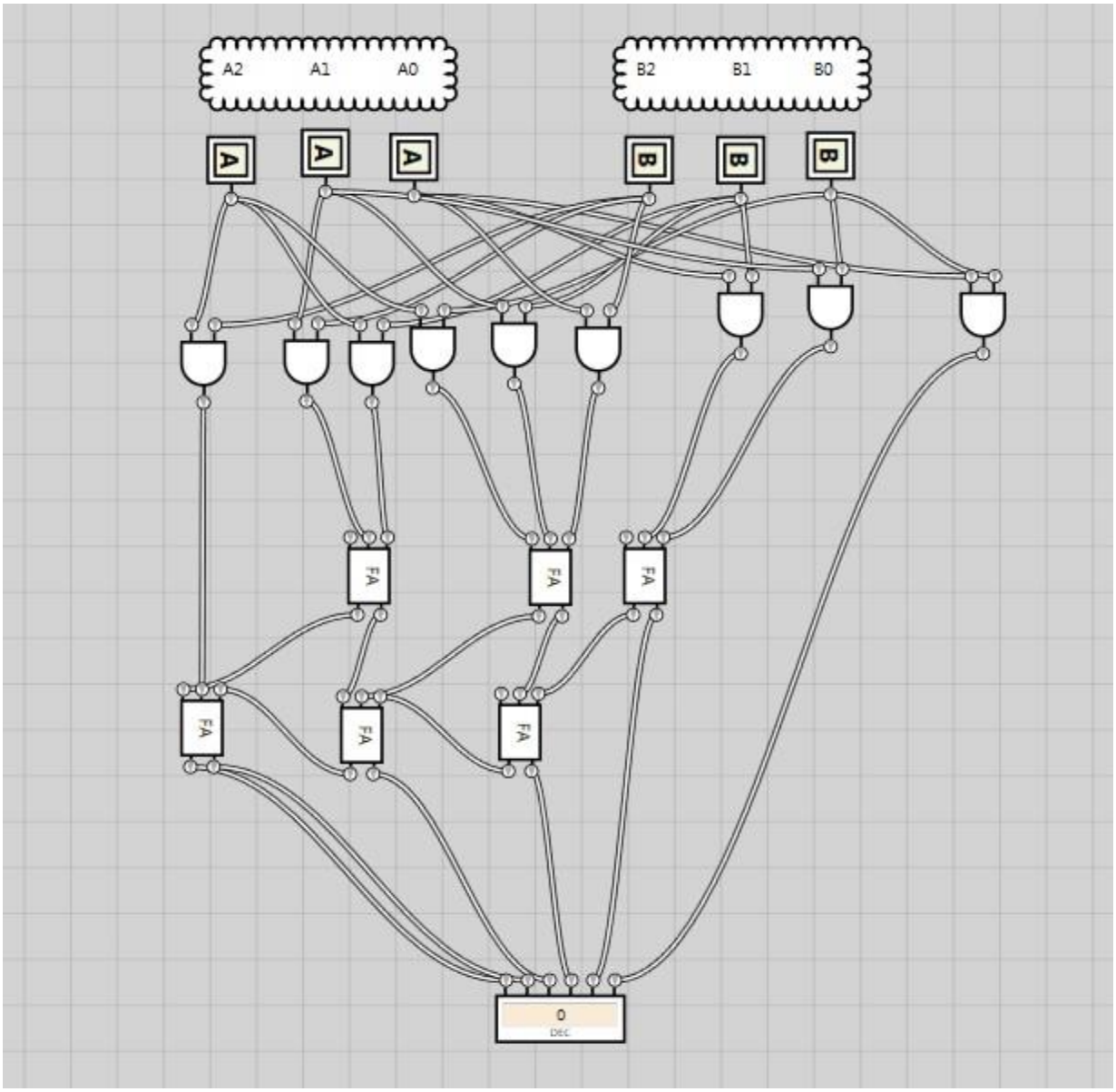
EXPERIMENT NO. 14 DATE:

CARRY SAVE MULTIPLIER

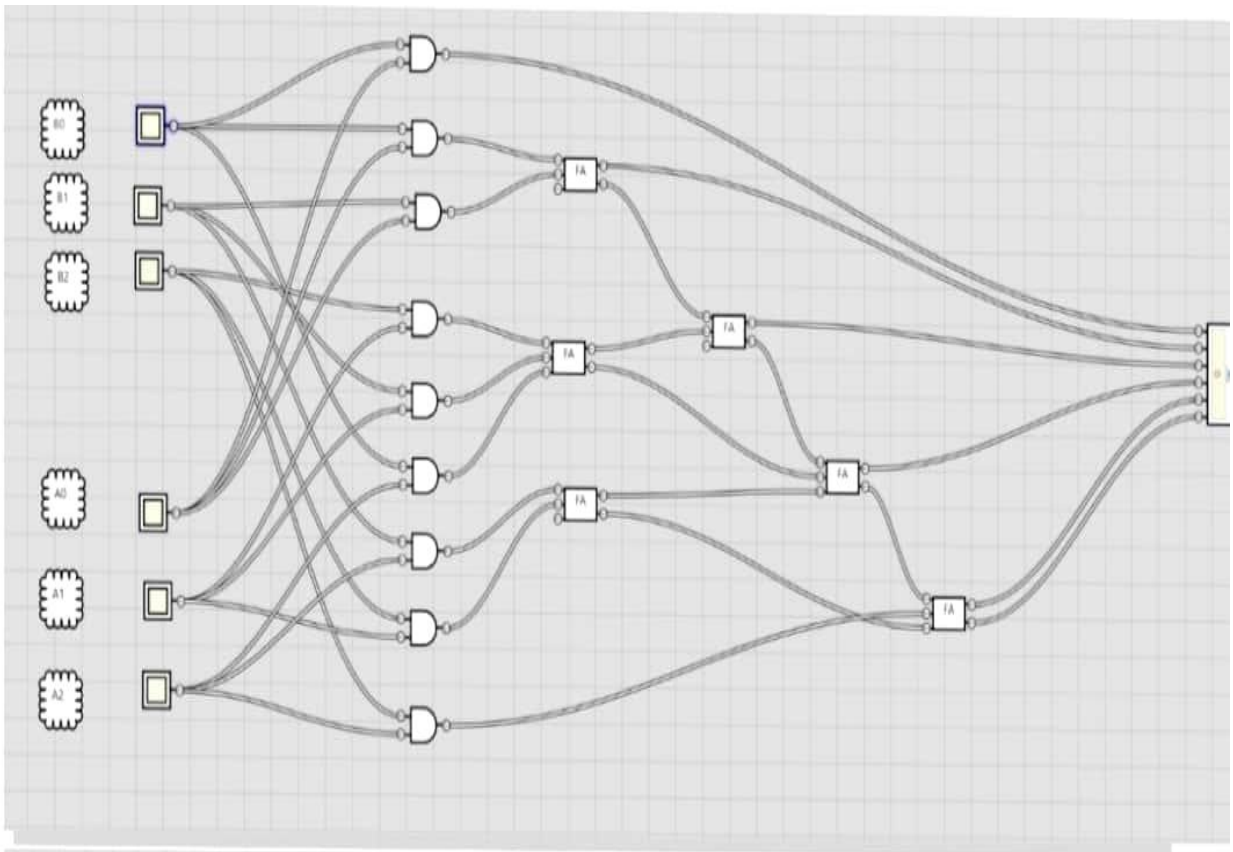
AIM : To design and implement a carry save multiplier.

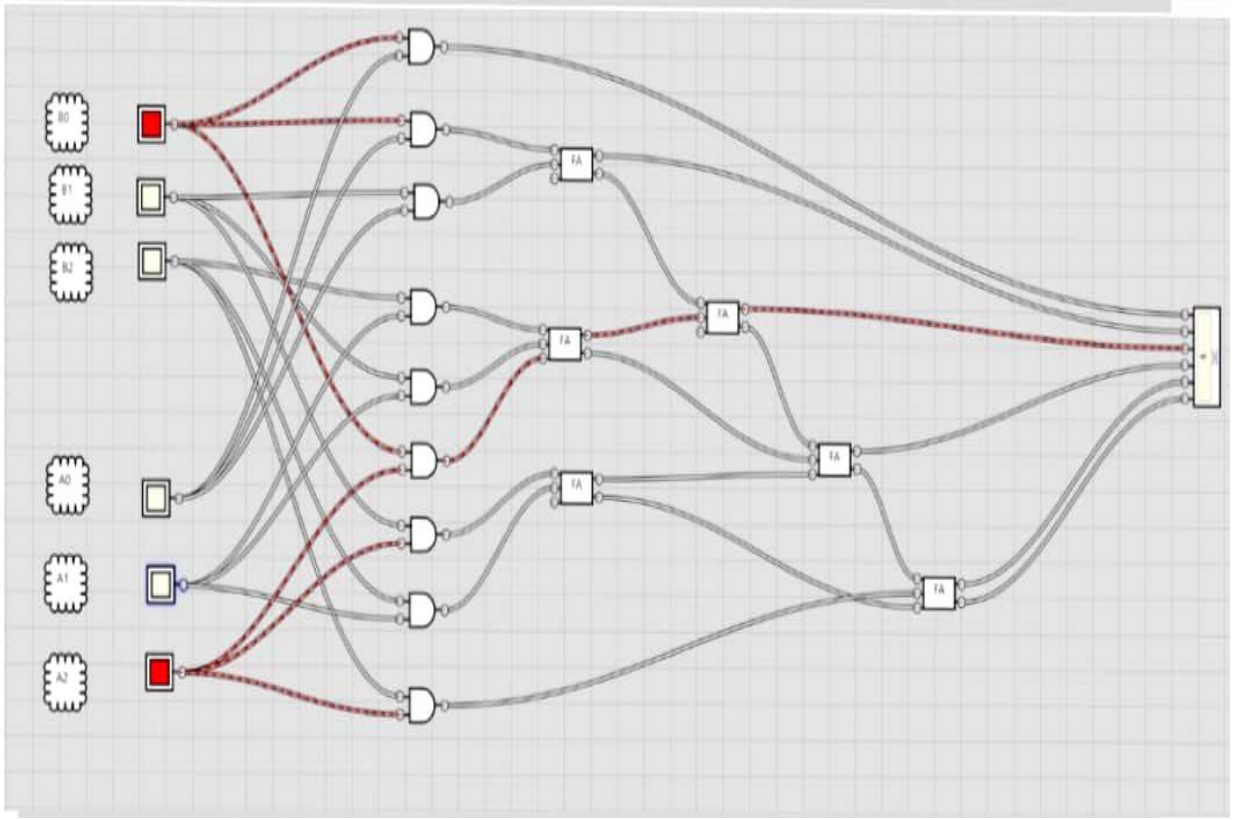
SOFTWARE USED : Logic gate simulator

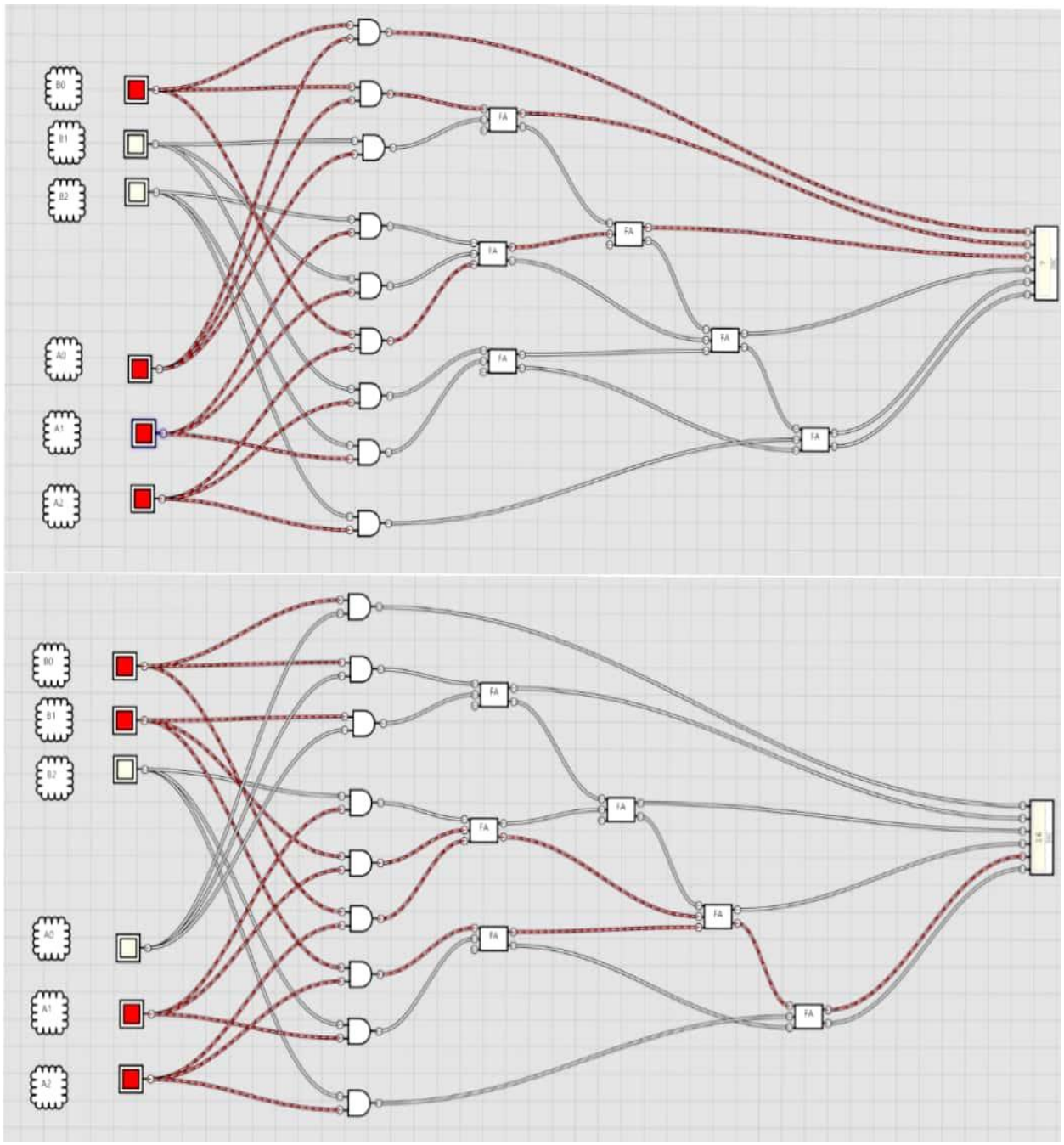
CIRCUIT DIAGRAM :



OUTPUT :


B0
B1
B2
A0
A1
A2
FA
FA
FA
FA
FA


B0
B1
B2
A0
A1
A2
FA
FA
FA
FA
FA



RESULT : Carry save multiplier was constructed in simulator & char. were studied.

EXPERIMENT NO. 15 DATE:

MULTIPLEXER

AIM : To design and implement a Multiplexer.

SOFTWARE USED : Logic gate simulator

TRUTH TABLE :

(4*1)

s_1	s_0	x_3	x_2	x_1	x_0	y
0	0	x	x	x	0	0
0	0	x	x	x	1	1
0	1	x	x	0	x	0
0	1	x	x	1	x	1
1	0	x	0	x	x	0
1	0	x	1	x	x	1
1	1	0	x	x	x	0
1	1	1	x	x	x	1

(8*1)

Select Data Inputs			Output
S_2	S_1	S_0	Y
0	0	0	D_0
0	0	1	D_1
0	1	0	D_2
0	1	1	D_3
1	0	0	D_4
1	0	1	D_5
1	1	0	D_6
1	1	1	D_7

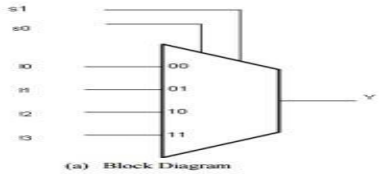
(16*1)

TRUTH TABLE

S0	S1	S2	S3	$\overline{E}$	SELECTED CHANNEL
X	X	X	X	1	None
0	0	0	0	0	0
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15

H= High Level
L= Low Level
X= Don't Care

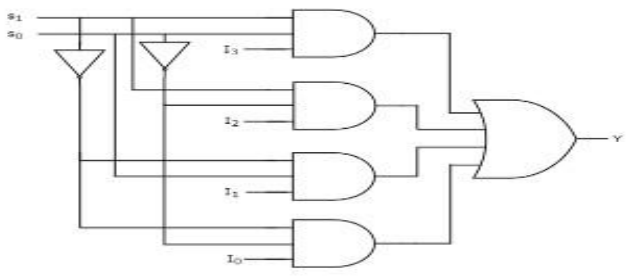
CIRCUIT DIAGRAM :

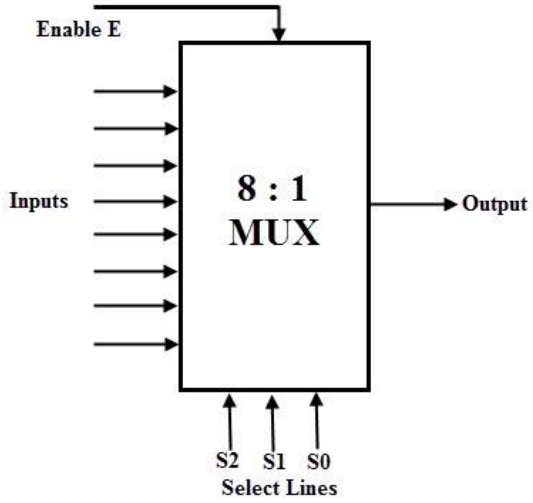


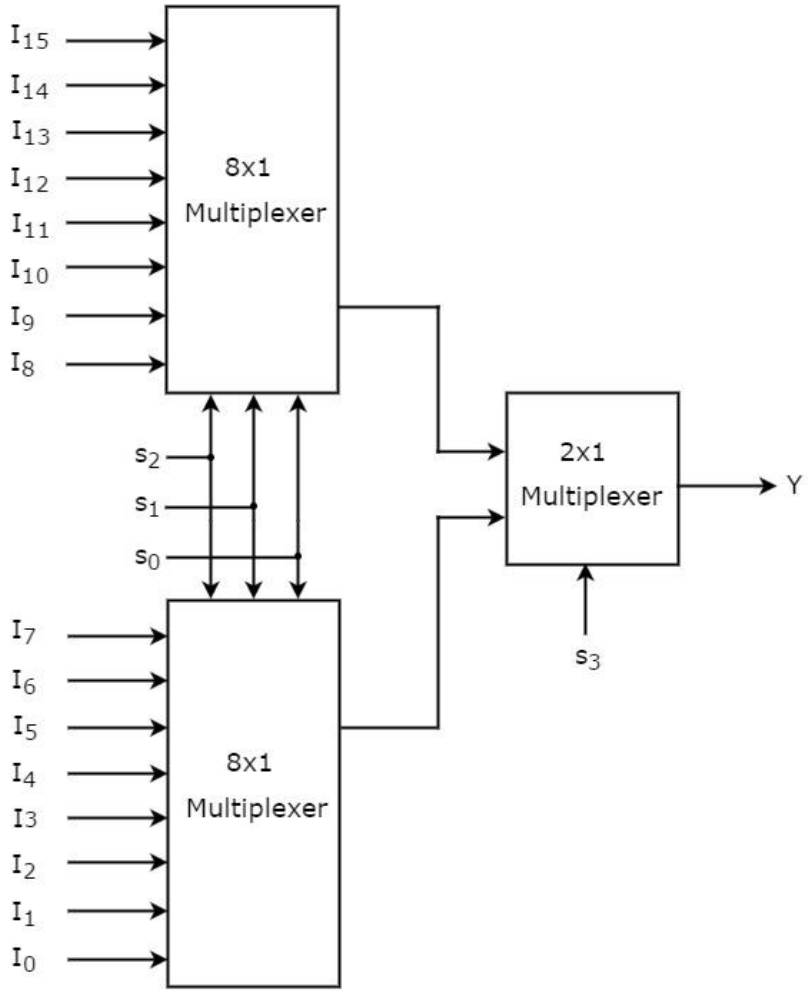
(a) Block Diagram

S1	S0	Y
0	0	I0
0	1	I1
1	0	I2
1	1	I3

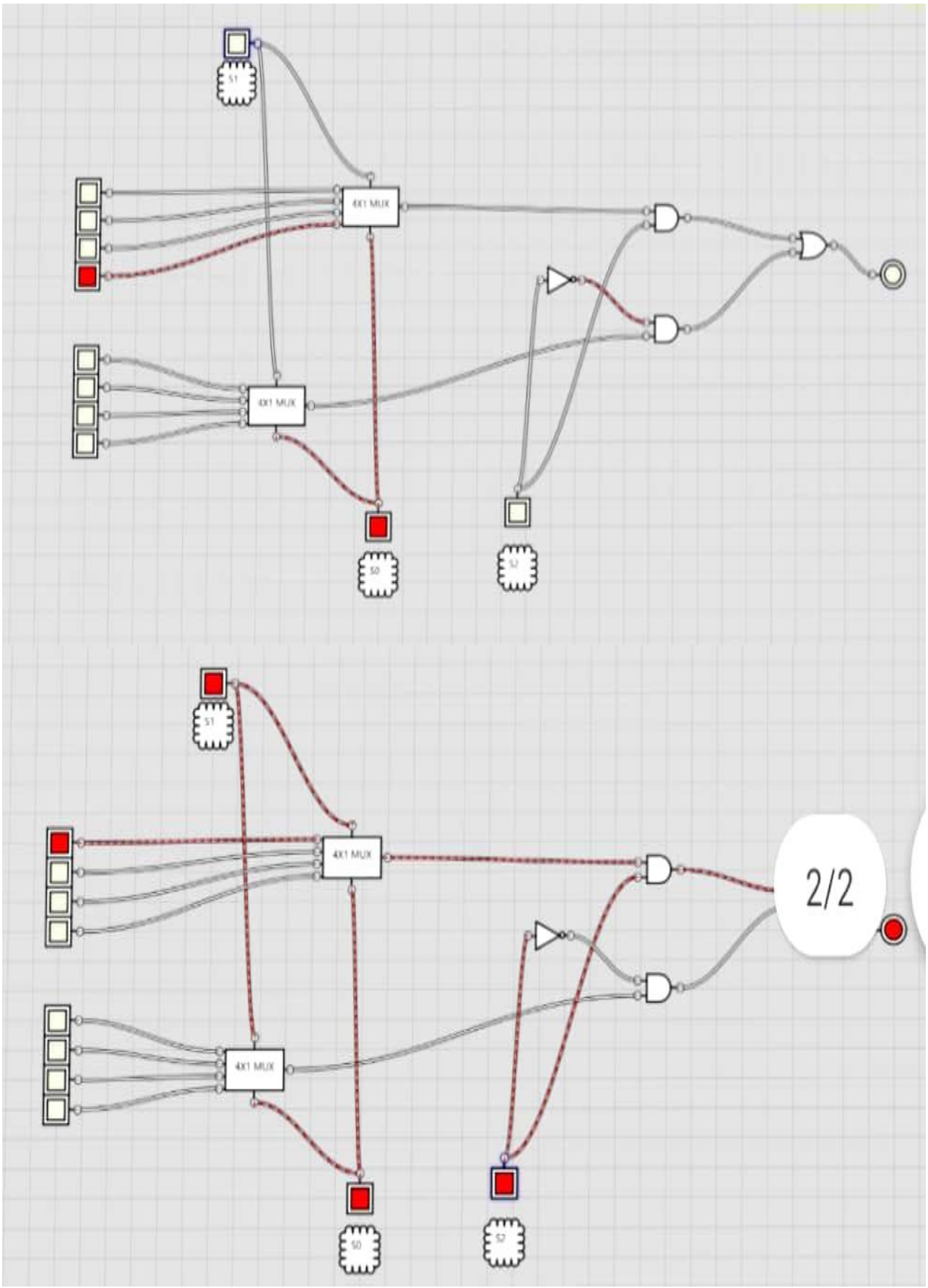
(b) Function Table

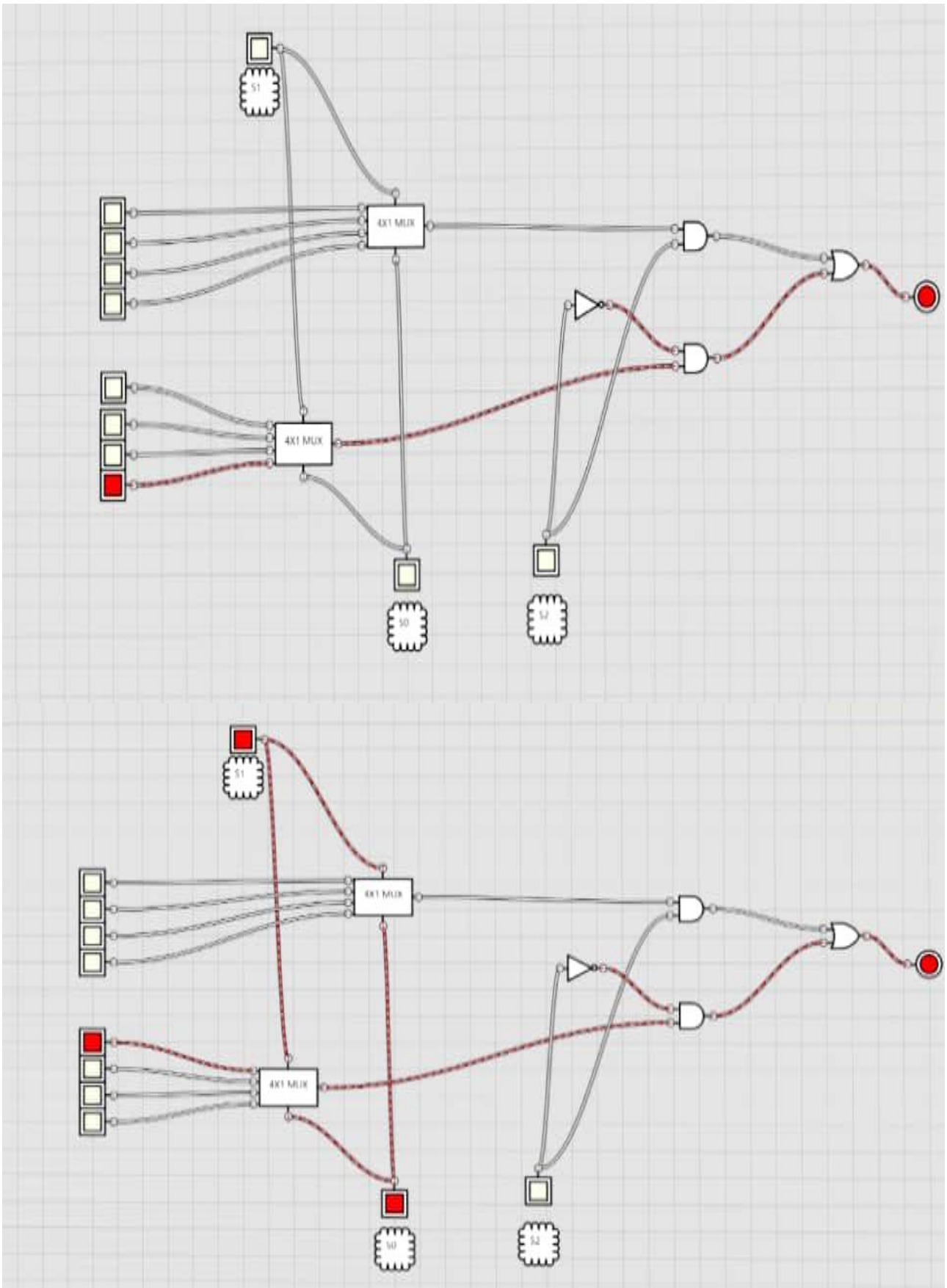


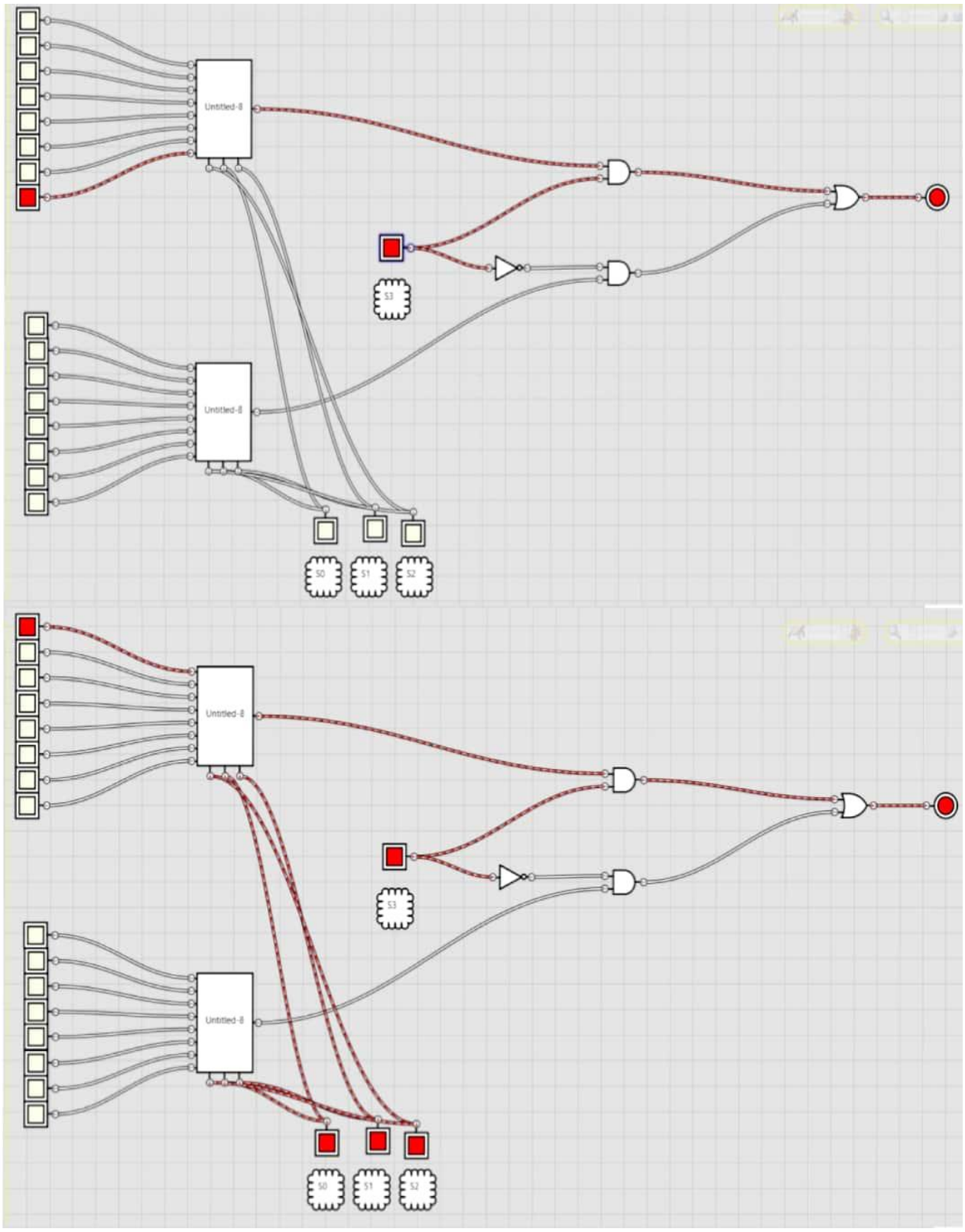

Enable E
Inputs
8 : 1
MUX
Output
S2
S1
S0
Select Lines


I15
I14
I13
I12
I11
I10
I9
I8
8x1
Multiplexer
s2
s1
s0
2x1
Multiplexer
Y
s3
I7
I6
I5
I4
I3
I2
I1
I0
8x1
Multiplexer

OUTPUT :


S1
4X1 MUX
4X1 MUX
S0
S2
S1
4X1 MUX
4X1 MUX
S0
S2
2/2


S1
4X1 MUX
4X1 MUX
S0
S2
S1
4X1 MUX
4X1 MUX
S0
S2



RESULT : 4:1, 8:1, 16:1 Multiplexers were constructed & studied.

EXPERIMENT NO. 16 DATE:

ARITHMETIC LOGIC UNIT (ALU)

AIM : To implement Arithmetic and Logical Unit which perform **Addition and subtraction arithmetic operations** and **AND, OR, XOR logical operations**.

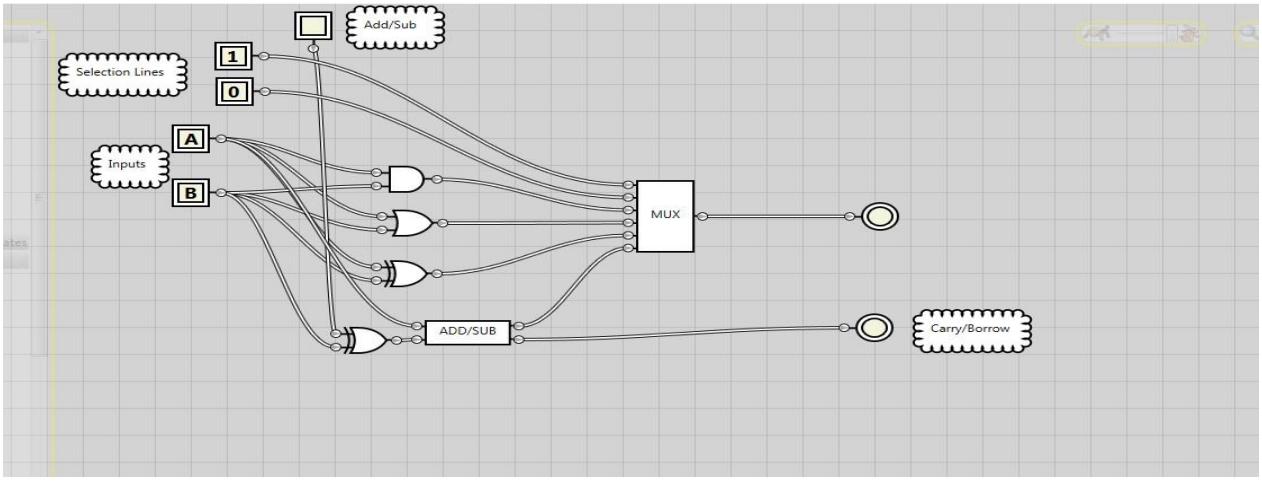
SOFTWARE USED : Logic gate simulator

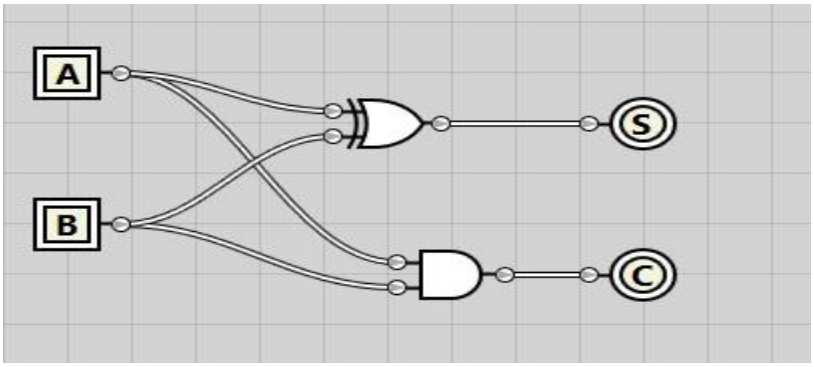
TRUTH TABLE :

TABLE I. TRUTH TABLE OF ALU

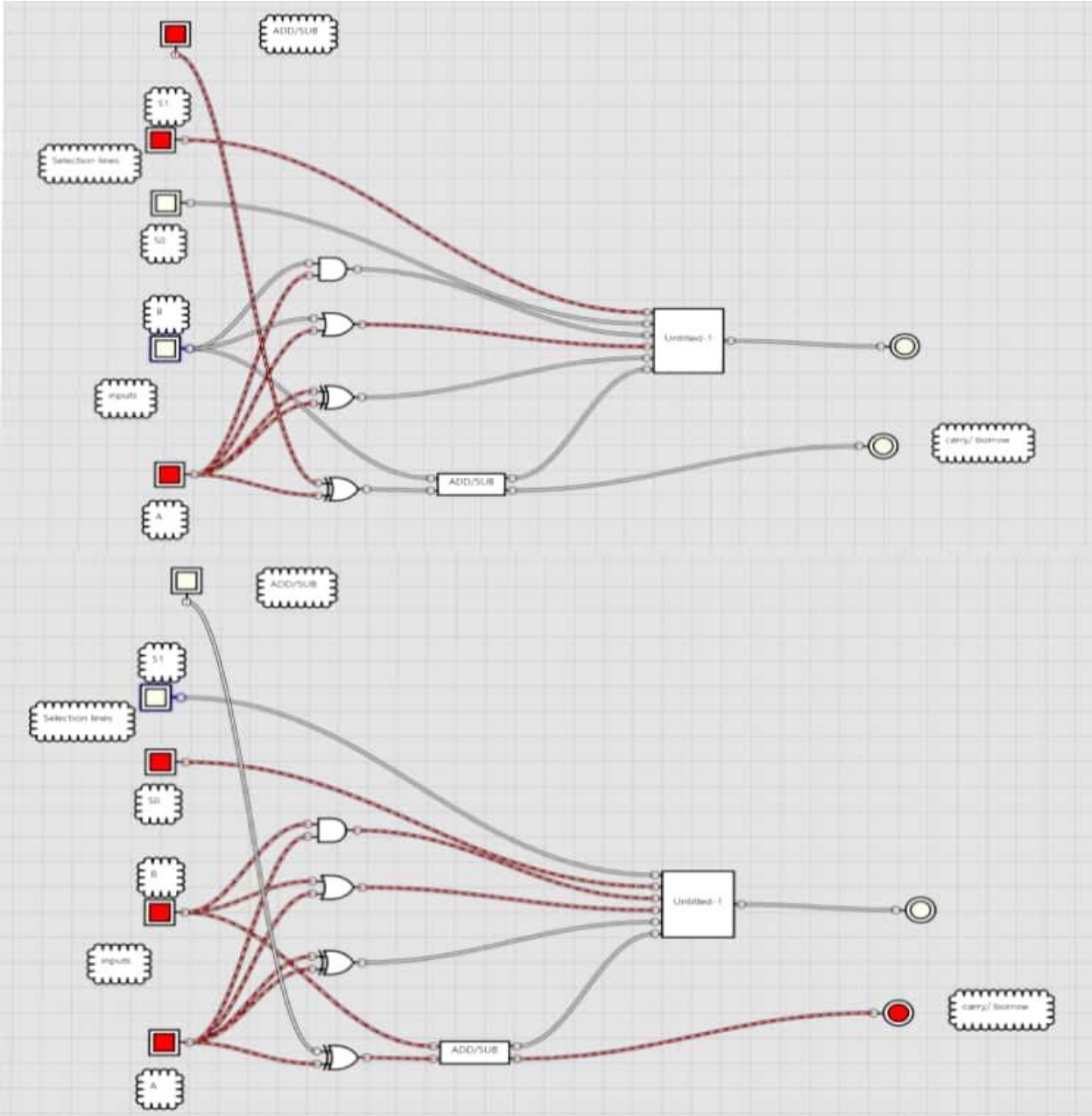
S_2	S_1	S_0	**OPERATION**
0	0	0	OR
0	0	1	XNOR
0	1	0	XOR
0	1	1	AND
1	0	0	INCREMENT
1	0	1	ADDITION
1	1	0	DECREMENT
1	1	1	SUBTRACTION

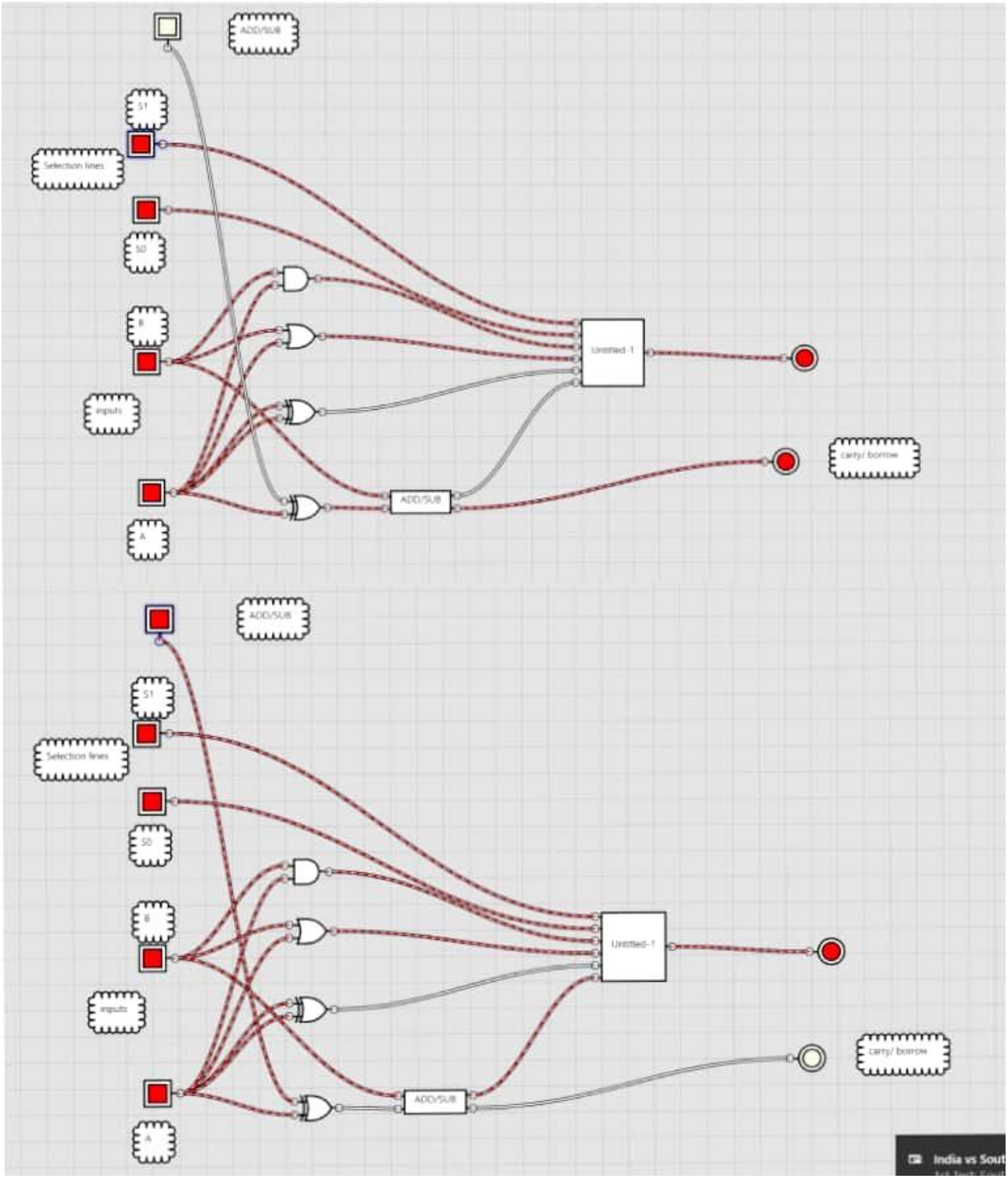
CIRCUIT DIAGRAM :





OUTPUT :


ADD/SUB
S1
Selection lines
S0
B
inputs
A
Untitled - 1
carry/ borrow
ADD/SUB
ADD/SUB
S1
Selection lines
S0
B
inputs
A
Untitled - 1
carry/ borrow
ADD/SUB



RESULT : Arithmetic logic unit was designed & studied.