Bahria University,

Karachi Campus

LAB EXPERIMENT NO.

10

LIST OF TASKS

TASK NO	OBJECTIVE
1.	Simplify the following equations using Boolean Laws and design the circuits of both given as well as simplified equations on Multisim. Construct the Truth Tables to verify that the simplified equations give the same result as that of the original equation. a. F = AB + A (B + C) + B (B + C) b. F = (A + C) (AD + AD′) + AC + C c. F = A′ (A + B) + (B + A) (A + B′) d. F = A · (B + C) + A′ · (B + C) e. F = A′ B′ C + A′ BC + ABC + AB′ C

Submitted On:

Date: 28/11/2025

Task No. 01:

"Simplify the following equations using Boolean Laws and design the circuits of both given as well as simplified equations on Multisim. Construct the Truth Tables to verify that the simplified equations give the same result as that of the original equation."

a. **F = AB + A (B + C) + B (B + C)**

b. **F = (A + C) (AD + AD') + AC + C**

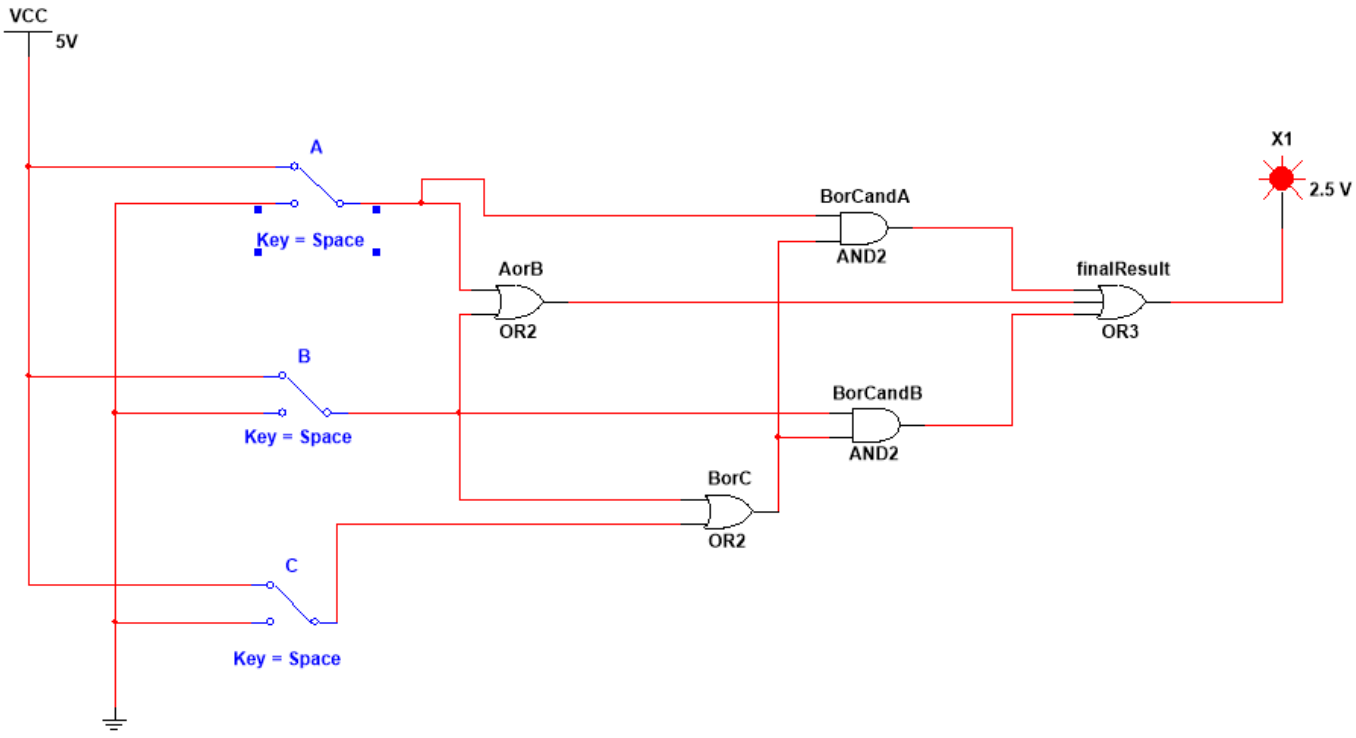
c. **F = A' (A + B) + (B + A) (A + B')**

d. **F = A · (B + C) + A' · (B + C)**

e. **F = A' B' C + A' BC + ABC + AB' C**

Circuit Snapshots and Truth Tables:

a. **F = AB + A (B + C) + B (B + C)**



A	B	C	AB	A (B + C)	B (B + C)	AB + A (B + C) + B (B + C
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	1	1
0	1	1	0	0	1	1
1	0	0	0	0	0	0
1	0	1	0	0	0	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

F = AB + A (B + C) + B (B + C)

F=AB+AB+AC+BB+BC

F=AB+AB+AC+B+BC …B.B=B

F=A(B+B)+AC+BC+B

A(B)+AC+BC+B …B+B=B

F=AB+AC+BC+B

F=AB+AC+B(C+1)

F=AB+AC+B(1) ...C+1=1

F=AB+AC+B

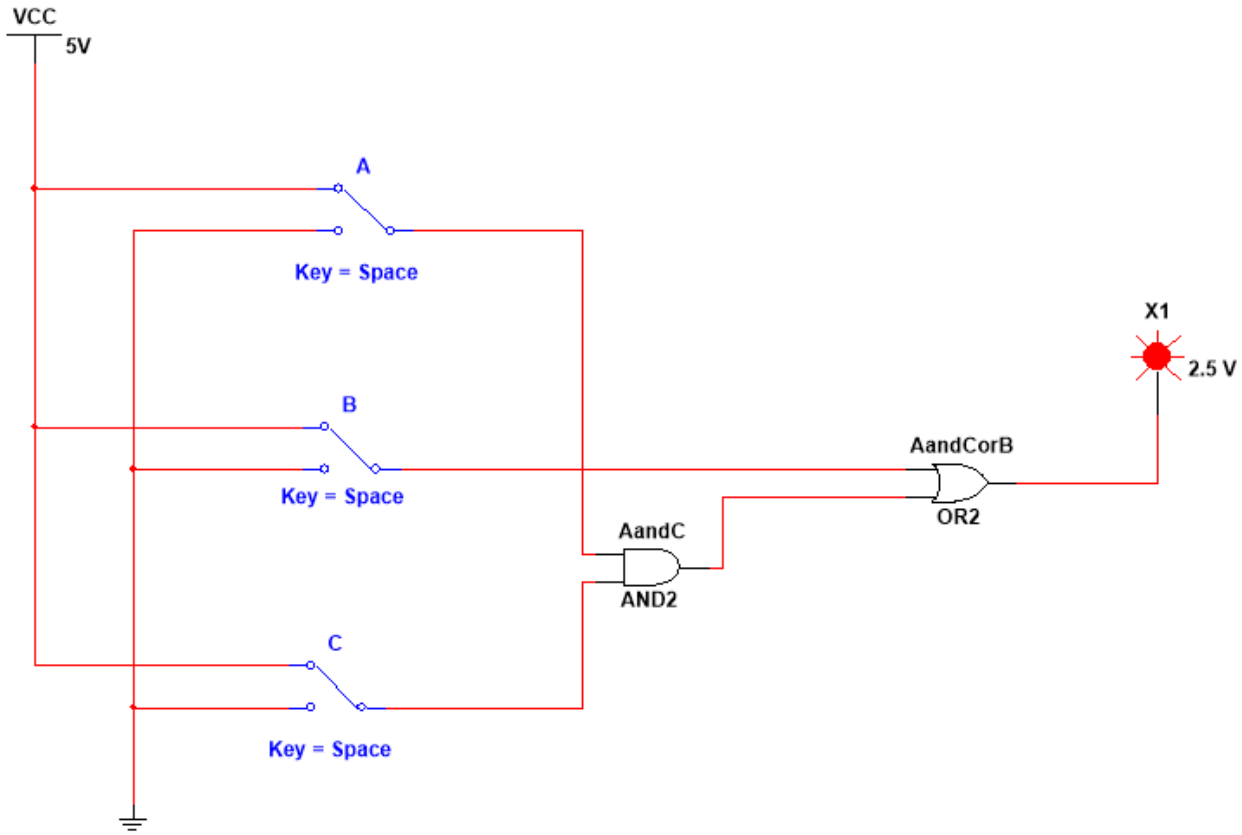
F=AB+B+AC

F=B(A+1)+AC

F=B(1)+AC …A+1=1

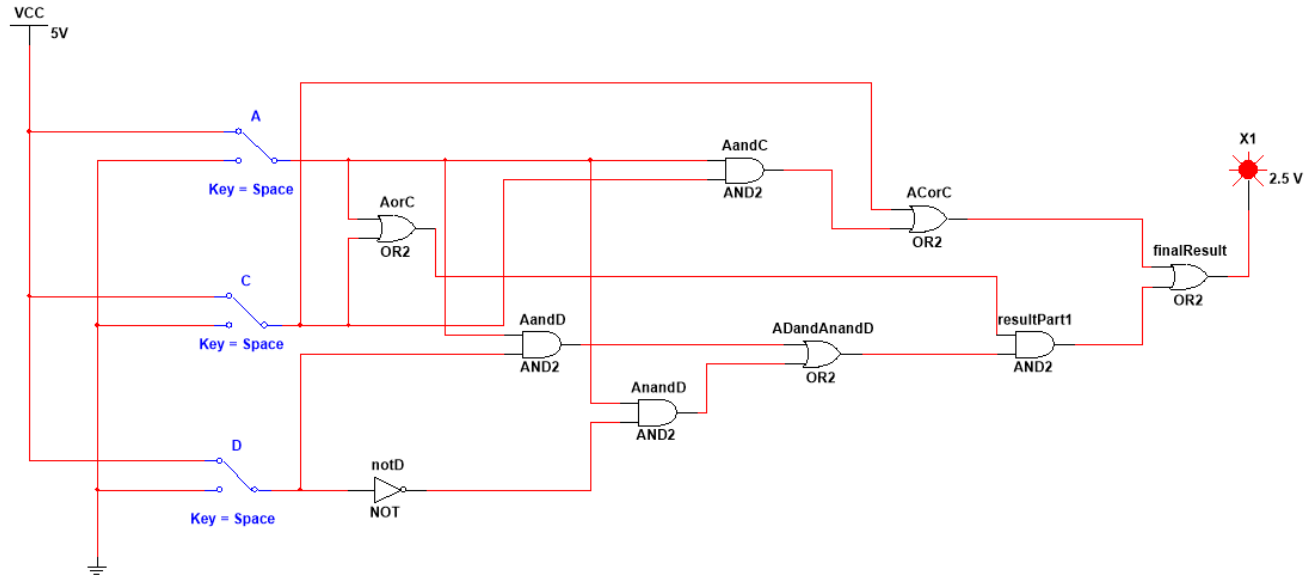
F=B+AC

F=AC+B



A	B	C	AC	AC+B
0	0	0	0	0
0	0	1	0	0
0	1	0	0	1
0	1	1	0	1
1	0	0	0	0
1	0	1	1	1
1	1	0	0	1
1	1	1	1	1

b. F = (A + C) (AD + AD') + AC + C



A	C	D	A+C	AD	AD'
0	0	0	0	0	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	1	1	0	0
1	0	0	1	0	1
1	0	1	1	0	1
1	1	0	1	1	0
1	1	1	1	1	0

(A + C) (AD + AD')	AC	(A + C) (AD + AD') + AC + C
0	0	0
0	0	1
0	0	0
0	0	1
1	0	1
1	1	1
1	0	1
1	1	1

F = (A + C) (AD + AD') + AC + C

F=(A+C)(AD+AD')+C(A+1)

F=(A+C)(AD+AD')+C(1) …A+1=1

F=(A+C)(AD+AD')+C

F=AAD+AAD'+ACD+ACD'+C

F=AD+AD'+ACD+ACD'+C …A.A=A

F=A(D+D')+AC(D+D')+C

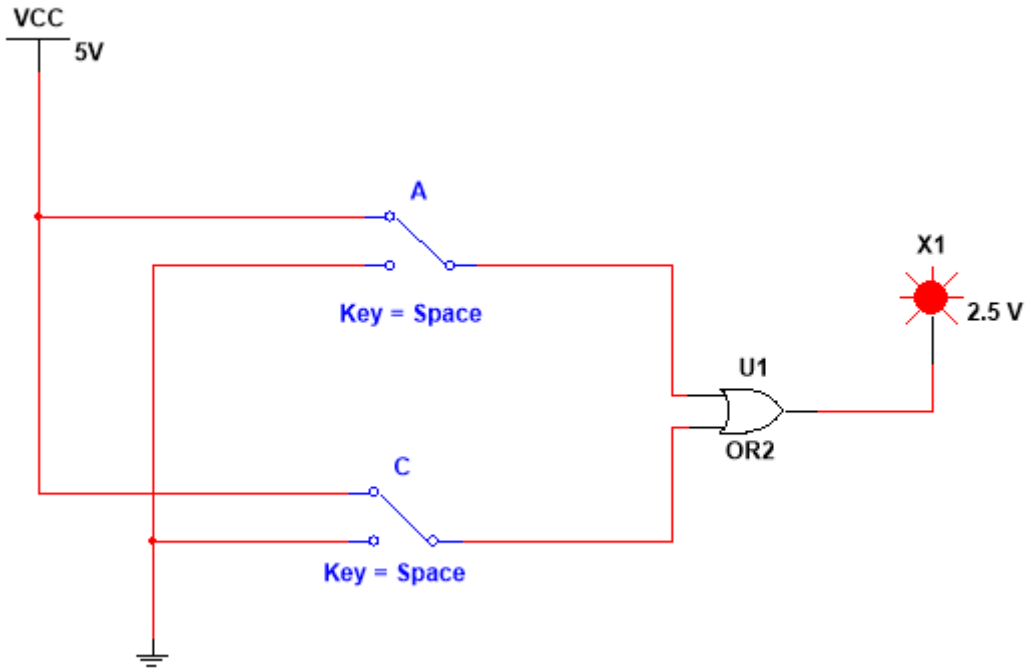
F=A(1)+AC(1)+C …D+D'=1

F=A+AC+C

F=A+C(A+1)

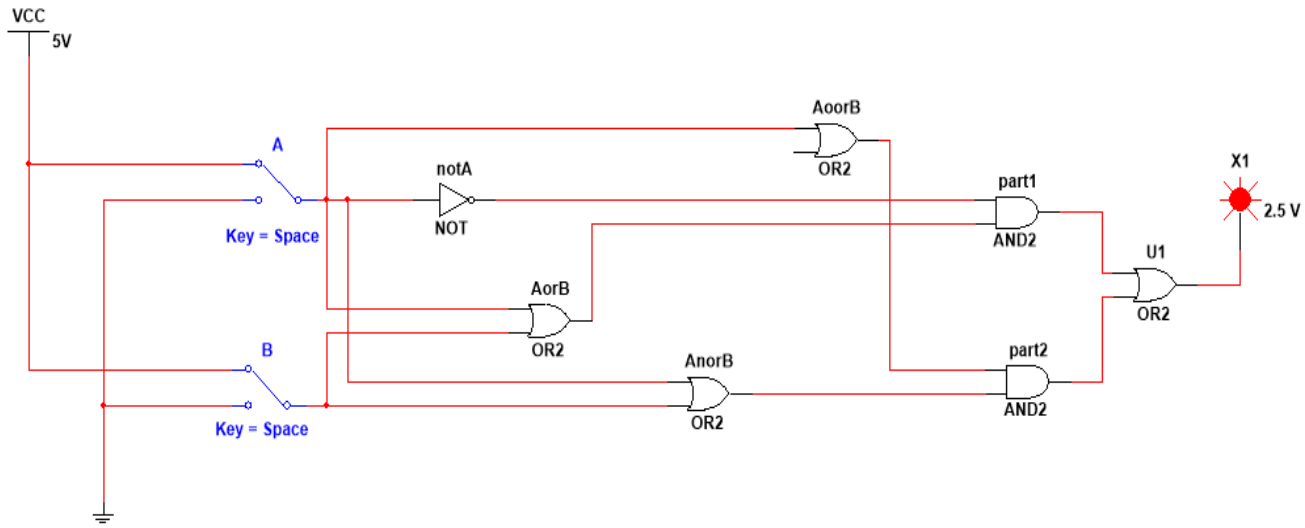
F=A+C(1) …A+1=1

F=A+C



A	C	A+C
0	0	0
0	1	1
1	0	1
1	1	1

c. F = A' (A + B) + (B + A) (A + B')



A	B	A'	B'	A+B	A' (A + B)
0	0	1	1	0	0
0	1	1	0	1	1
1	0	1	1	1	0
1	1	1	0	1	0

(B+A)	(A + B')	(B+A)(A+B')	A' (A + B) + (B + A) (A + B')
0	1	0	0
1	0	0	1
1	1	1	1
1	1	1	1

F=A' (A + B) + (B + A) (A + B')

F= A' (A + B) + (A+B) (A + B') ...B+A=A=+B

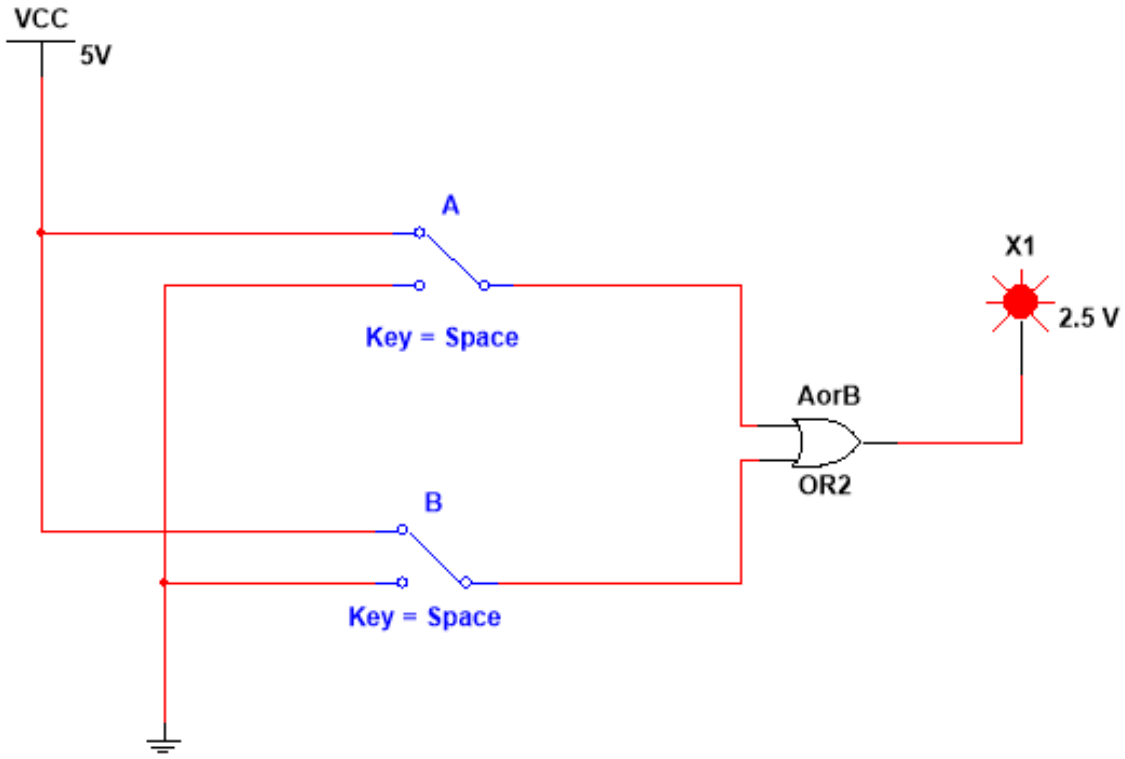
F=A+B(A'+(A+B'))

F=A+B(A'+A+B')

F=A+B(1+B') ...A'+A=1

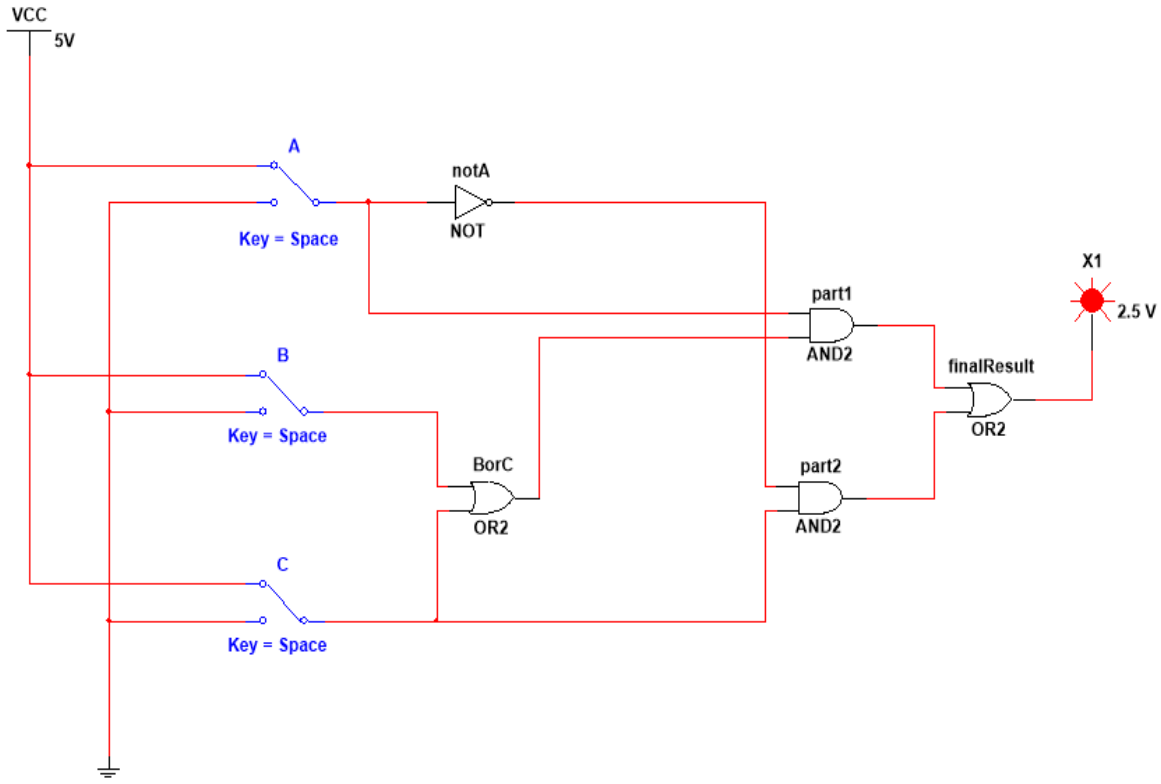
F=A+B(1) ...1+B'=1

F=A+B



A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

d. F = A · (B + C) + A' · (B + C)



A	B	C	A'	B + C	A · (B + C)
0	0	0	1	0	0
0	0	1	1	1	0
0	1	0	1	1	0
0	1	1	1	1	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	0	1	1
1	1	1	0	1	1

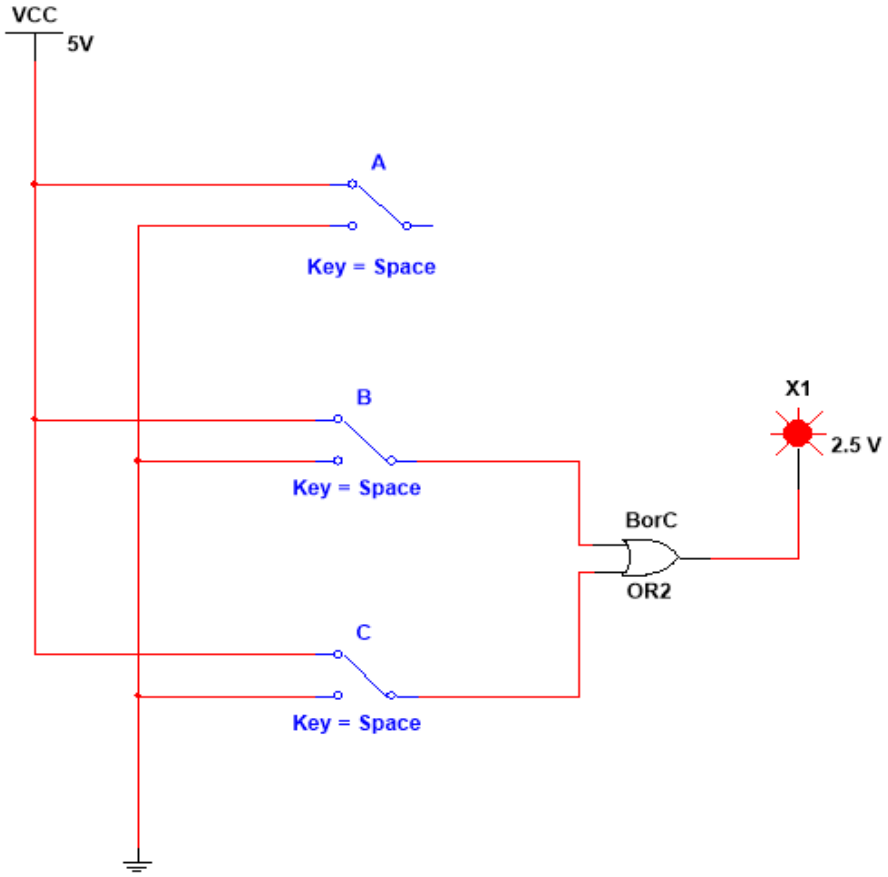
A' · (B + C)	A · (B + C) + A' · (B + C)
0	0
1	1
1	1
1	1
0	0
0	1
0	1
0	1

F=A · (B + C) + A' · (B + C)

F=B+C(A+A')

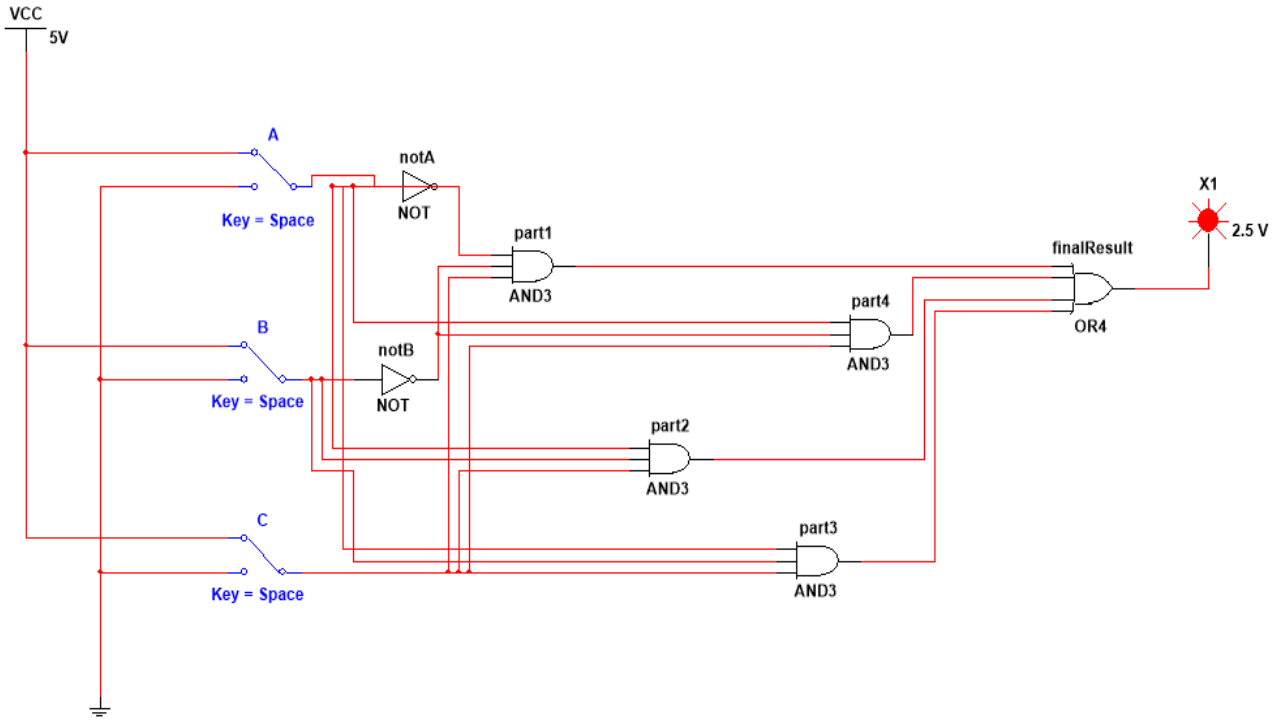
F=B+C(1) …A+A'=1

F=B+C



B	C	B+C
0	0	0
0	1	1
1	0	1
1	1	1

e. F = A′ B′ C + A′ BC + ABC + AB′ C



A	B	C	A'	B'	A'B'C	A'BC
0	0	0	1	1	0	0
0	0	1	1	1	1	0
0	1	0	1	0	0	0
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	1	0	1	0	0
1	1	0	0	0	0	0
1	1	1	0	0	0	0

ABC	AB′ C	A′ B′ C + A′ BC + ABC + AB′ C
0	0	0
0	0	1
0	0	0
0	0	1
0	0	0
0	1	1
0	0	0
1	0	1

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

F=A'C(B'+B)+AC(B+B')

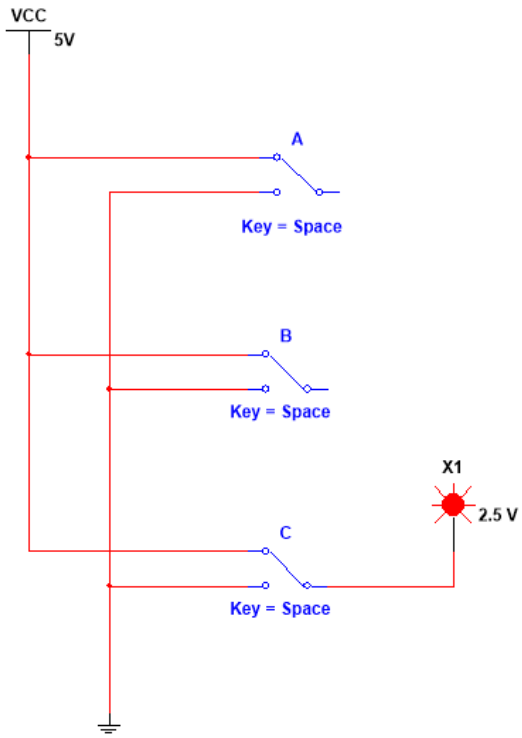
F=A'C(1)+AC(1) …B+B'=1

F=A'C+AC

F=C(A+A')

F=C(1) …A+A'=1

F=C



C	F
0	0
1	1
1	0