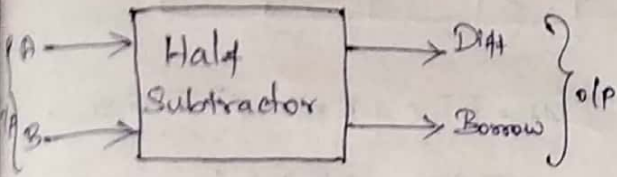
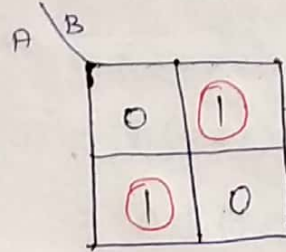
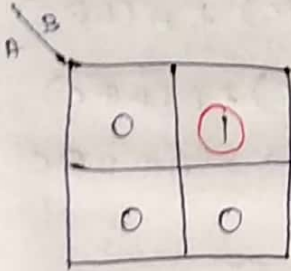


HALF SUBTRACTOR.

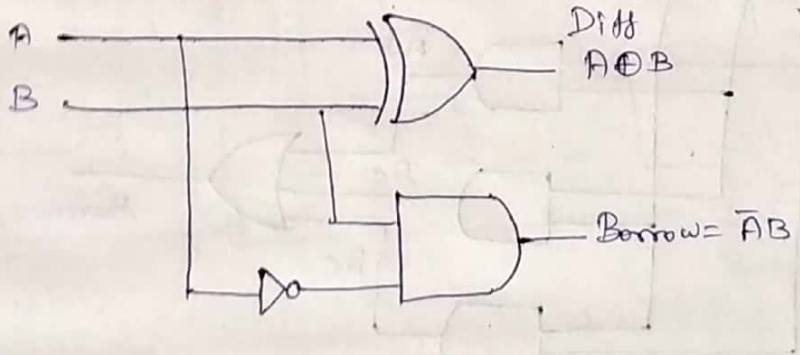


I/P		O/P	
A	B	Bor	Diff
0	0	0	0
0	1	1	1
1	0	0	1
1	1	0	0



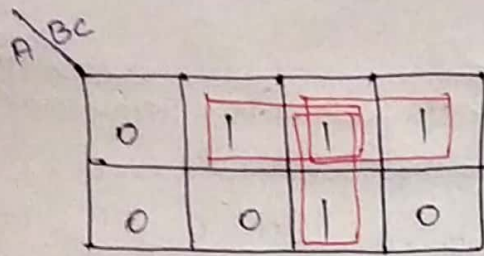
Borrow = $\bar{A}B$

Difference = $A\bar{B} + \bar{A}B = A \oplus B$

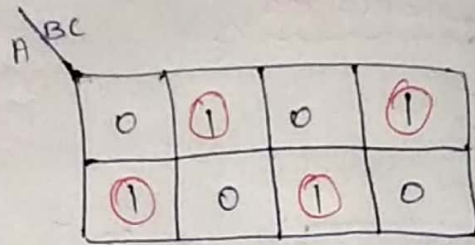


FULL SUBTRACTOR.

I/P			O/P	
A	B	C	B	D
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1



$$\text{Borrow} = \bar{A}B + B\bar{C} + \bar{A}C$$



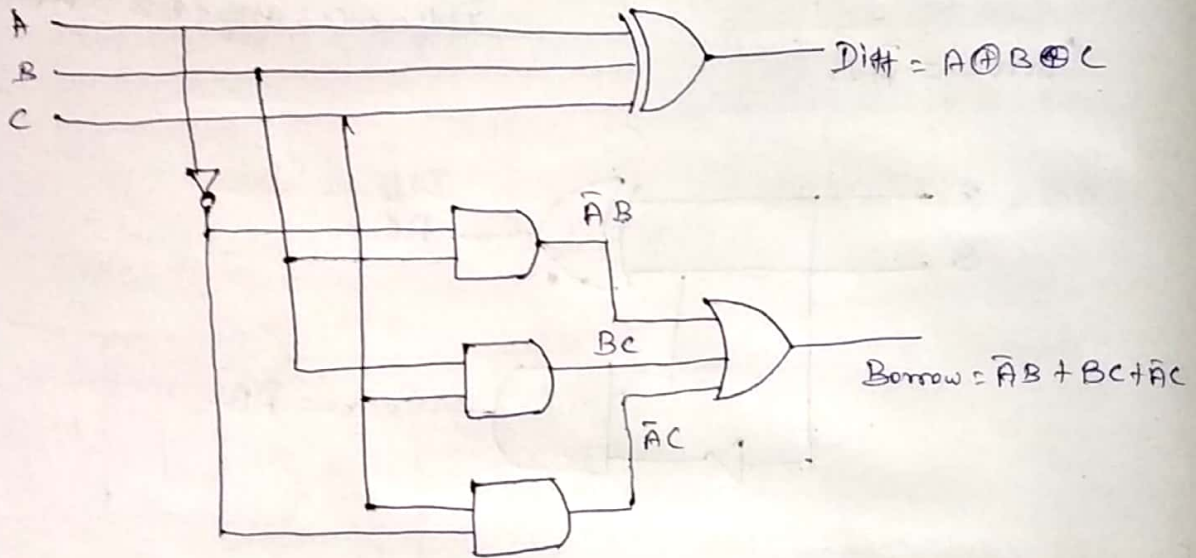
$$\text{Diff} = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

$$= \bar{A}(B\bar{C} + \bar{B}C) + A(\bar{B}\bar{C} + BC)$$

$$= \bar{A}(B\oplus C) + A(B\oplus C)$$

$$= \bar{A}(B\oplus C) + A(\overline{B\oplus C})$$

$$= A\oplus(B\oplus C) = A\oplus B\oplus C$$



Full Subtractor Using Half Subtractor.

i/p			o/p	
A	B	C	B	D
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

A \ BC	00	01	11	10
0	0	1	1	1
1	0	0	1	0

A \ BC	00	01	11	10
0	0	1	0	1
1	1	0	1	0

$$\text{Borrow} = \bar{A}\bar{B}C + A\bar{B}C + \bar{A}B$$

$$= C(\bar{A}\bar{B} + A\bar{B}) + \bar{A}B$$

$$= C(\bar{A} \oplus B) + \bar{A}B$$

$$= \bar{A}B + C(\overline{A \oplus B})$$

$$\text{Diff} = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

$$= \bar{A}(\bar{B}C + B\bar{C}) + A(\bar{B}\bar{C} + BC)$$

$$= \bar{A}(B \oplus C) + A(B \oplus C)$$

$$= \bar{A}(B \oplus C) + A(\overline{B \oplus C})$$

$$= A \oplus (B \oplus C) = A \oplus B \oplus C$$

