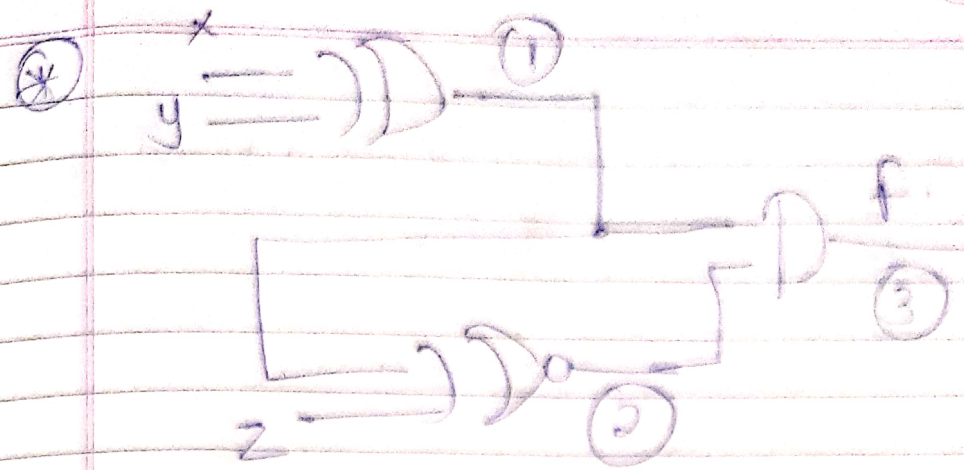


Ans.

(1) $x \oplus y$.

(2) $(x \oplus y)z + \overline{(x \oplus y)} \cdot \bar{z}$

$\Rightarrow$

(3) $[x \oplus y]\left[(x \oplus y)z + \overline{(x \oplus y)} \cdot \bar{z}\right]$

$\Rightarrow (x \oplus y)(x \oplus y)z + (x \oplus y)\overline{(x \oplus y)} \cdot \bar{z}$

$A \cdot \bar{A} = 0$.

$= 0$

$= 0$.

$(x \oplus y)(x \oplus y)z$. $[AAz = Az]$

$= (x \oplus y)z$.

$= x'yz + xy'z$ ✓

Q. Min. no. of Nand Gates.

→ Try to convert into $(\overline{AB})$ Nand form

(1) Make sop form.

(2) minimise the expression.

(3) search for bubbled or.

↓

→ Make or as bubbled or

→ make and as Nand.

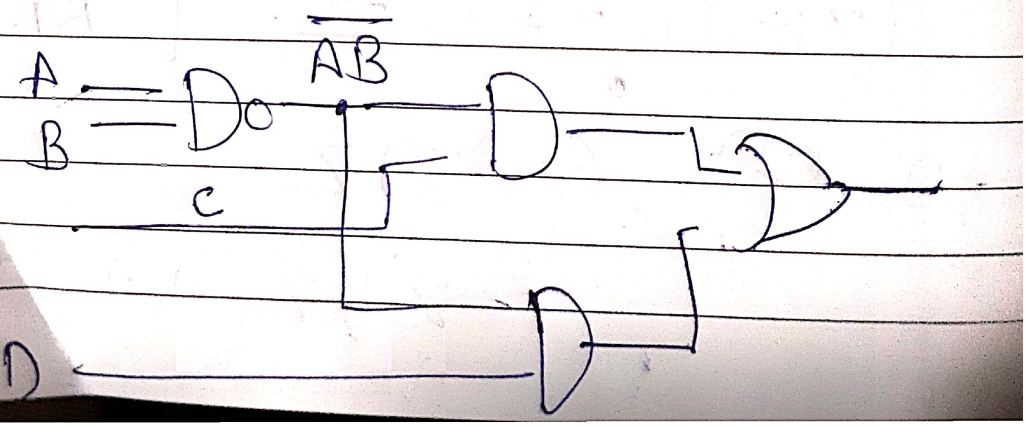
Ex. $(\bar{A}+\bar{B})(C+D)$.

(1) SOP form.

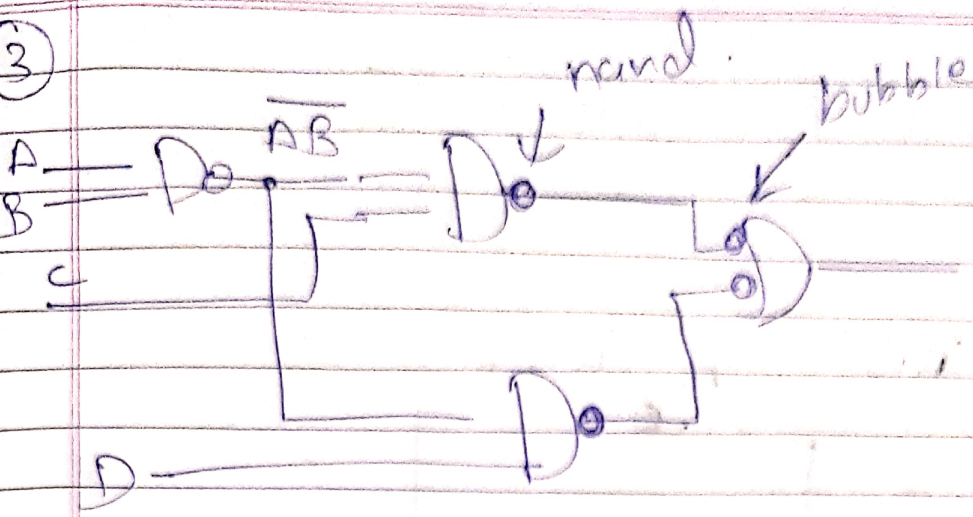
$(\overline{AB})(C+D)$.

$\Rightarrow \overline{AB}C + \overline{AB}D$.

(2)



(3)



Ans. 4.

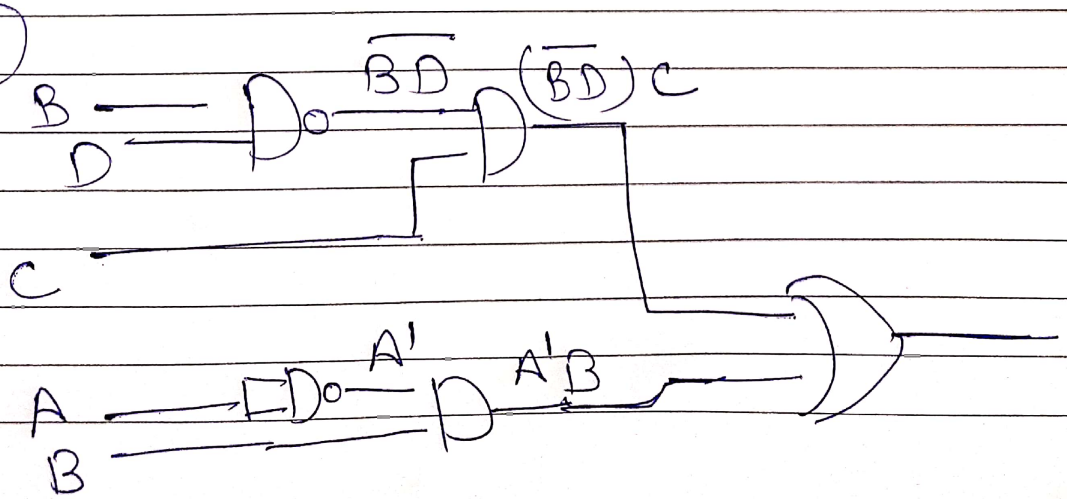
Q. $A'B + B'C + CD'$

$\Rightarrow$ (1) $A'B + C(B' + D')$

$\Rightarrow A'B + C(\overline{BD})$

↳ 1 nand.

(2)



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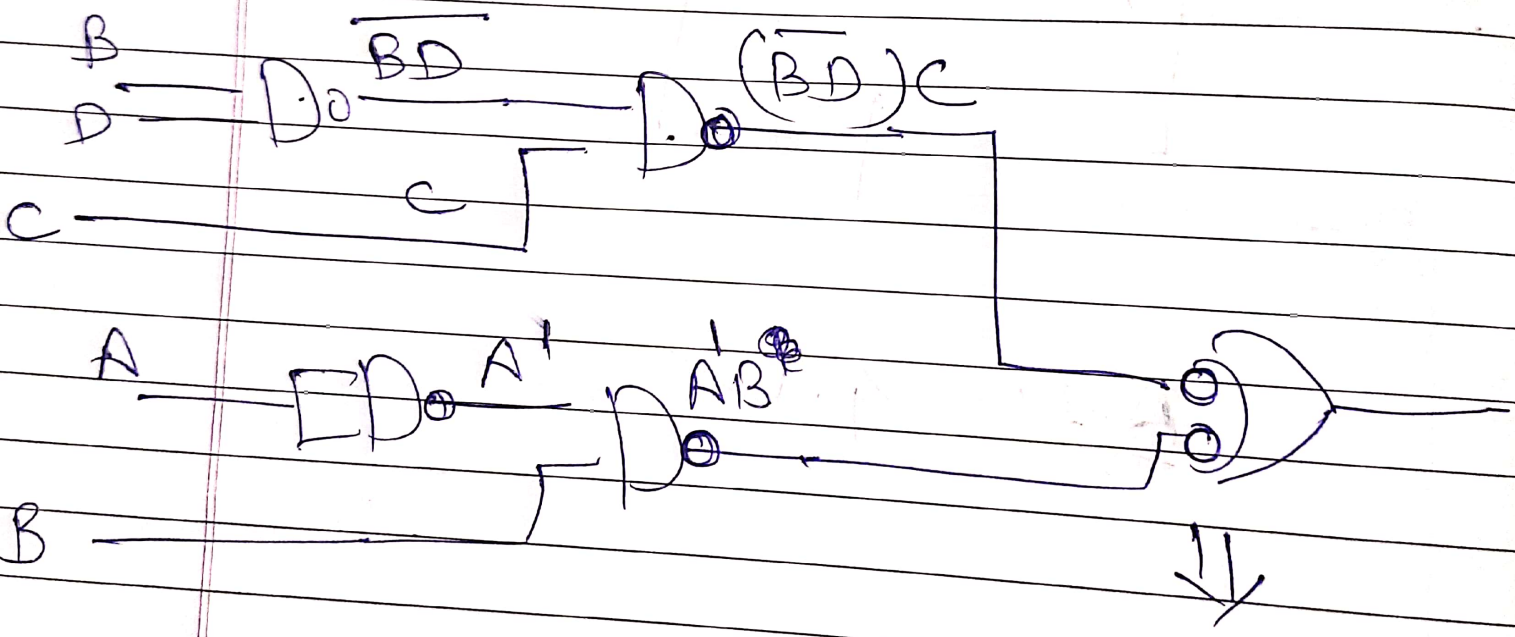
(3) make And into Nand.
or into bubbled or.



This is Nand..

Total no.

= 5 ✓

for Nor gates

(c)

→ Same As Nand.

→ Convert Into Pos form.

→ or → nor

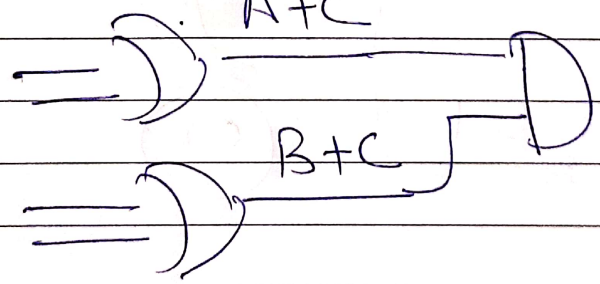
And → bubbled and

(1) AB + C.

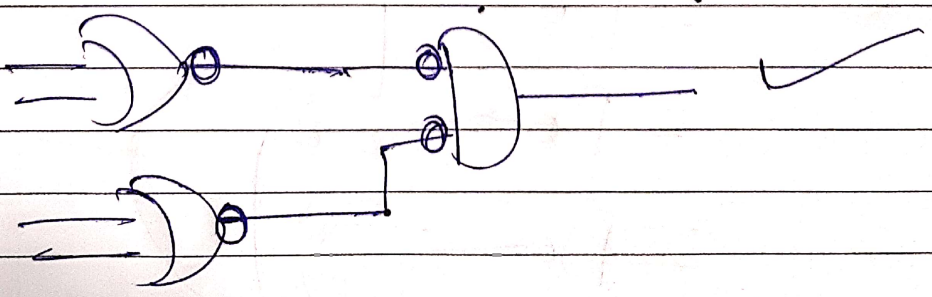
→ Distributive law.

(A+C)(B+C)

(2)



(3)

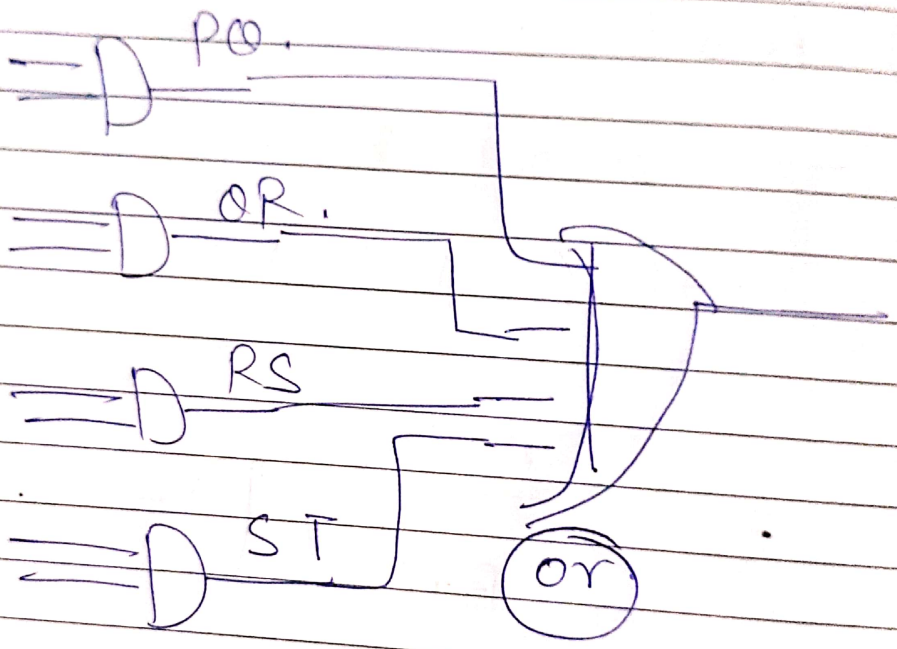


Q. PQ + QR + RS + ST.

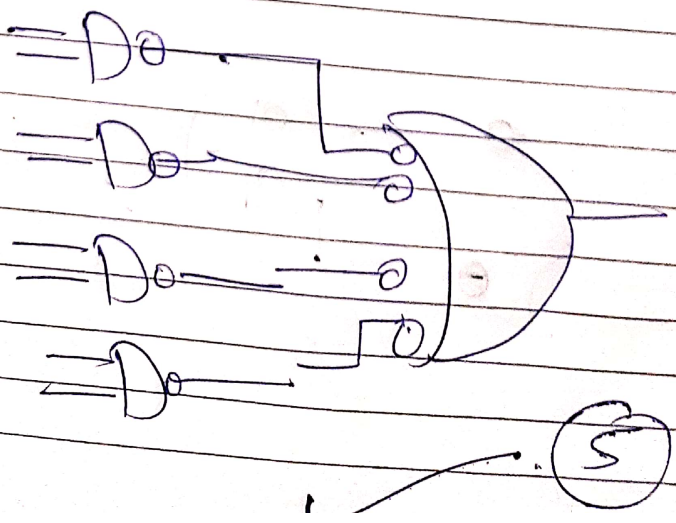
(1) Min. Nand Gates ?

(2) min. Nor gates ?

Ans (1) Nand Gates.



(2)



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→ Pos form.

$PQ + QR + RS + ST.$

$Q.(P+R) + S(R+T)$

* $AB+DC$. Distributive

$= (AB+D)(AB+C)$.

$\Rightarrow [[(P+R)Q + S)].(P+R)Q + (R+T)]$

Again Distributive law.

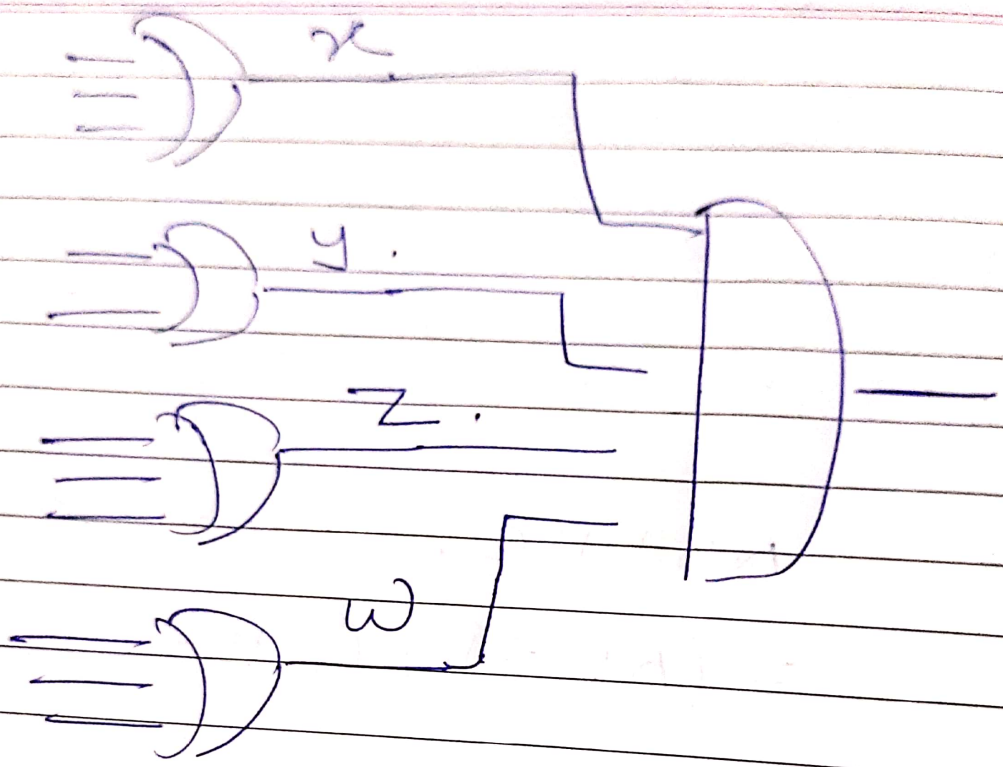
$AB+C = (A+C)(B+C)$

$\Rightarrow (S+P+R)(S+Q)][(R+T+Q)([R+T)(P+R)$

$=0$ $(S+P+R)(S+Q)$ $[(R+T+Q)(R+T+P)]$.

x y z w

Pos form.



→ Convert OR to NOR
And to bubb. And.

No. of NOR gates.

= 5 ✓

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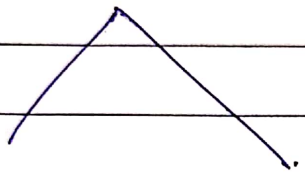
Full Adder

(1) Sum = $A \oplus B \oplus C$.

(2) Carry.



(A) $AB + (A \oplus B)C$. (B) $AB + BC + CA$.

3 And (Parallel)
1 Or.

⇒ Take Prop. delay of Sum & Carry seperately.