→ Fault-

Suppose there is a fault due to which - Input y is stuck at 0

∵ If $x=0, y=1$ input is given by user, then $x=0, y=0$ will be the input that would be going to circuit.

- How to detect whether an "and" gate has a fault due to which y is stuck at 0.

Give Input $x=1$ and $y=1$. If output is 0, ~~the~~ then fault

- To test fault - input should be as such that the outputs in case of fault and no fault are different from each other.

- OR - $x+y$

y is stuck at 0.

How to detect it

$xy = 01$ ⇒ Output is 0

- XOR - xy ~~00~~ ⇒ 00 → 0 ; 01 → 1 ; 10 → 1 ; 11 → 0

Let y be stuck at 0.

$y=1, x=0$ → This helps to detect fault.

Complementation fault at input -

This means whatever the user input is, the complimen of that would be passed to the system.

Suppose- AND gate - complementation fault at y

Suppose $x = 1$
and user pass $y = 1$
then Output = 0 ; expected output = 1

, user pass $y = 0$
then output = 1 ; expected output = 0

∴ to delect complementation fault at y in AND gate,
$x = 1$, $y =$ anything.

XOR : complementation at y.

~~We know~~ ~~x=~~ In XOR - xy and xy' are always opposite.

Therefore this can be detected for any example of x and y.

→ Fault Locate - Where is the fault when it is known there is fault.

— Permitted Instructions —

ib ← number
s ← ib   t ← ib
ib ← s+t   -,*,/ similar
a ← ib
ib ← a
print(ib)
MR ≡ memory read ⇒ b ← [a]
MW ≡ memory write ⇒ [a] ← b

Suppose we want to store 2 at memory address = 42

then

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ib ← 42
a ← ib
ib ← 2
b ← ib
MW
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register a contains the address ← a ← ib

register b contains the value ← b ← ib

'a' is also called MAR ≡ memory address register
'b' " " " MBR = " buffer register

* a, b are general purpose registers also but for memory read and write instructions
a and b act as memory registers

C acts as PC

* ib ← PC is valid

- $+ \equiv$ OR ; $\cdot \equiv$ AND ; $' \equiv$ NOT

i) Boolean exp. true for $xy = 10$ only $\equiv xy'$

ii) true for $xy=00$ and $xy=11$ $\equiv \boxed{x'y' + xy}$

↳ Sum of product form

Another Possible Ans -

Product of Sum form

$$\Rightarrow \boxed{\left((x+y)\cdot(x'+y')\right)'}$$

Another ans $\equiv \boxed{(x+y')\cdot(x'+y)}$

iii) SOP form; True for $xyz = 010$; 110

Ans $= \boxed{yz'}$ (∵ x can be anything)

iv) True for $xyz = 010$; 110 and 111

$\Rightarrow 010 + 110 + 111$

$\Rightarrow 010+110+110+111$ (∵ $a+a=a$)

$\Rightarrow \_10 + 11\_$

$\Rightarrow yz' + xy$

* Proove $\equiv \boxed{a + a'b = a+b}$

$a + (a'b) = (a+a')\cdot(a+b)$

$= a+b$

if a and b are sets, then

In sets ; $a - b = a \cdot b' \equiv a \text{ AND } (\text{NOT } b)$