Parity Generator / Checker

The parity generator / checker main function is to detect errors in data transmission.

It detects the single bit error.

Why:- At the transmitting end → there is data & that encripted data is send at the receiving end & if it is send as it is then no error.

But sometimes due to noise, medium there is error in data.

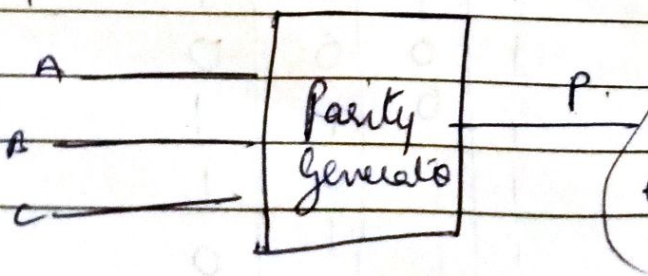
So one bit error can be detected by parity checker / generated.

Odd Parity generator — Even parity generator

Parity generator → is a combinational circuit which takes the message from the original circuit & Generates the parity bit & sends the receiver along with parity bit.

Even Parity Generator :-

It maintains the binary data with even number of 1's. O/p is dependent on the present given input.



even No of 1's is even Parity Bit will be 0 even

odd No's of 1's odd Parity Bit will be 1

A	B	C	Even Parity
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Expression

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

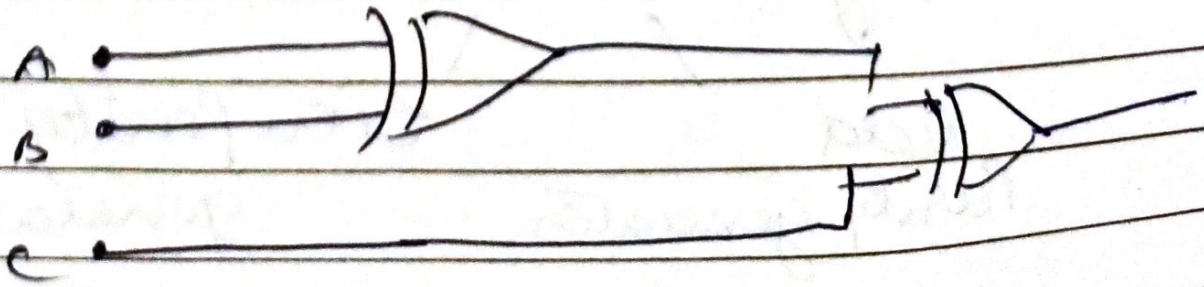
$= \bar{A}(\bar{B}C + B\bar{C}) + A(\bar{B}\bar{C} + BC)$

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

$= A \oplus B \oplus C$

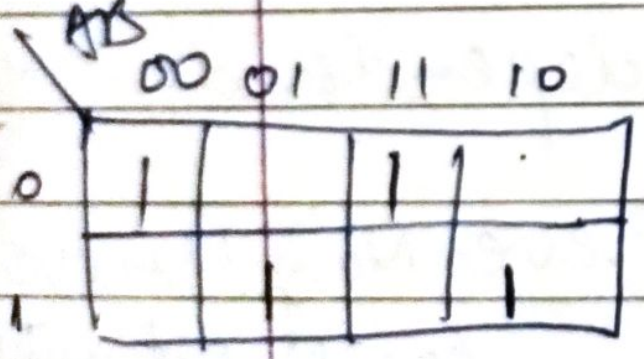
AB / C	00	01	11	10
0		1		1
1	1		1	

even Parity generator



Odd Parity generator :- It maintains the Binary data's no. of 1's as odd.

If there is Even No of 1's the odd parity generator will make the number as odd



A	B	C	Odd parity
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

Expression :-

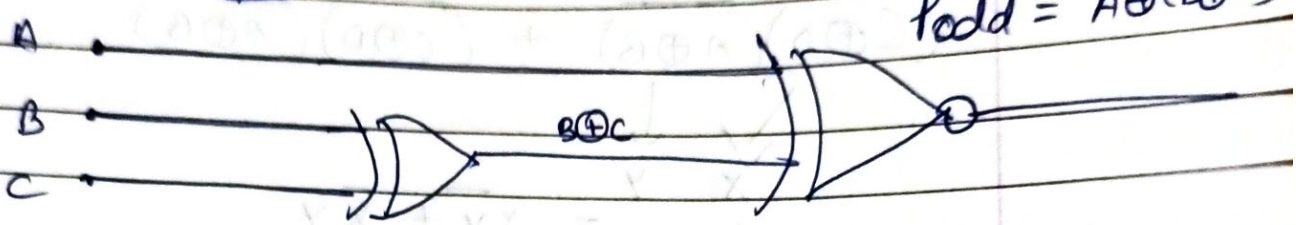
$= \bar{A}\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C + ABC$

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

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

Ex NOR

$\overline{A \oplus (B \oplus C)}$



4 Bit Even Parity Generator

A	B	C	D	Even Parity
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

Checkboard configu

Expression :-

$P = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D} + \bar{A}BCD + A\bar{B}\bar{C}\bar{D} + A\bar{B}CD + AB\bar{C}D + ABC\bar{D}$

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

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

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

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

$X \quad Y$

$$= X\bar{Y} + \bar{X}Y$$

$$= X \oplus Y.$$

$$\boxed{P = A \oplus B \oplus C \oplus D}$$