Ayush Vinod Upadhyay
IO24 I-1
60003220131

LDCA - Experiment 4

Aim : To study even and odd parity generator and parity checker.

Apparatus : TinkerCAD software

Description :

① Parity generator : It is a combinational circuit that accepts n-1 bit data and generates the additional bit that is to be transmitted with the bit stream. This additional bit is called parity bit.

Even - Parity generator

A	B	C	P
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

Odd - Parity generator.

A	B	C	P
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

K-map for 3-bit even parity generator

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

K-map for 3-bit odd parity generator

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

$P = A \oplus B \oplus C$

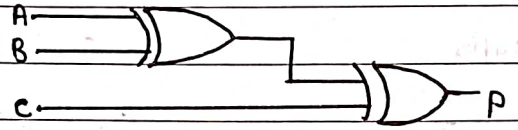
$P = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$

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

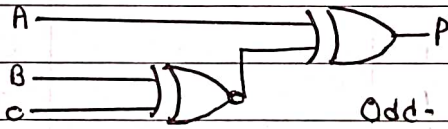
$= \bar{A}(B \oplus C) + A(\overline{B \oplus C})$

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

$P = A \oplus B \oplus C$



Even Parity Generator.



Odd - Parity Generator.

(Q) Parity Checker.

It is a logic circuit that checks for possible errors in transmission when it is used as an even parity checker, the number of input bit must always be even.

Even - parity checker.

If any error occurs the received message consists of odd no. of 1's.

The output of parity checker is denoted by PEC (parity error checker)

3 bit even parity checker (OIP, PEO_1)

3 bit odd parity checker (OIP; PEO_2)

P	B_2	B_1	B_0	PEO_1	PEO_2
0	0	0	0	0	1
0	0	0	1	1	0
0	0	1	0	1	0
0	0	1	1	0	1
0	1	0	0	1	0
0	1	0	1	0	1
0	1	1	0	0	1
0	1	1	1	1	0
1	0	0	0	1	0
1	0	0	1	0	1
1	0	1	0	0	1
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	1	1	0
1	1	1	0	1	0
1	1	1	1	0	1

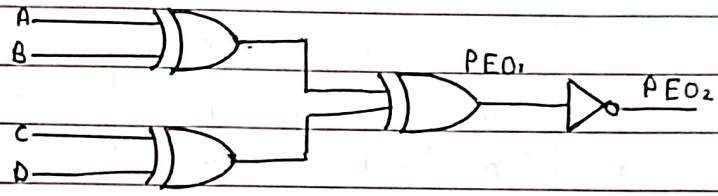
K-map for PEO_1 and PEO_2

B_1B_0 \ PB_2	00	01	11	10
00	0	1	0	1
01	1	0	1	0
11	0	1	0	1
10	1	0	1	0

$PEO_1 = P \oplus B_2 \oplus B_1 \oplus B_0$

B_1B_0 \ PB_2	00	01	11	10
00	1	0	1	0
01	0	1	0	1
11	1	0	1	0
10	0	1	0	1

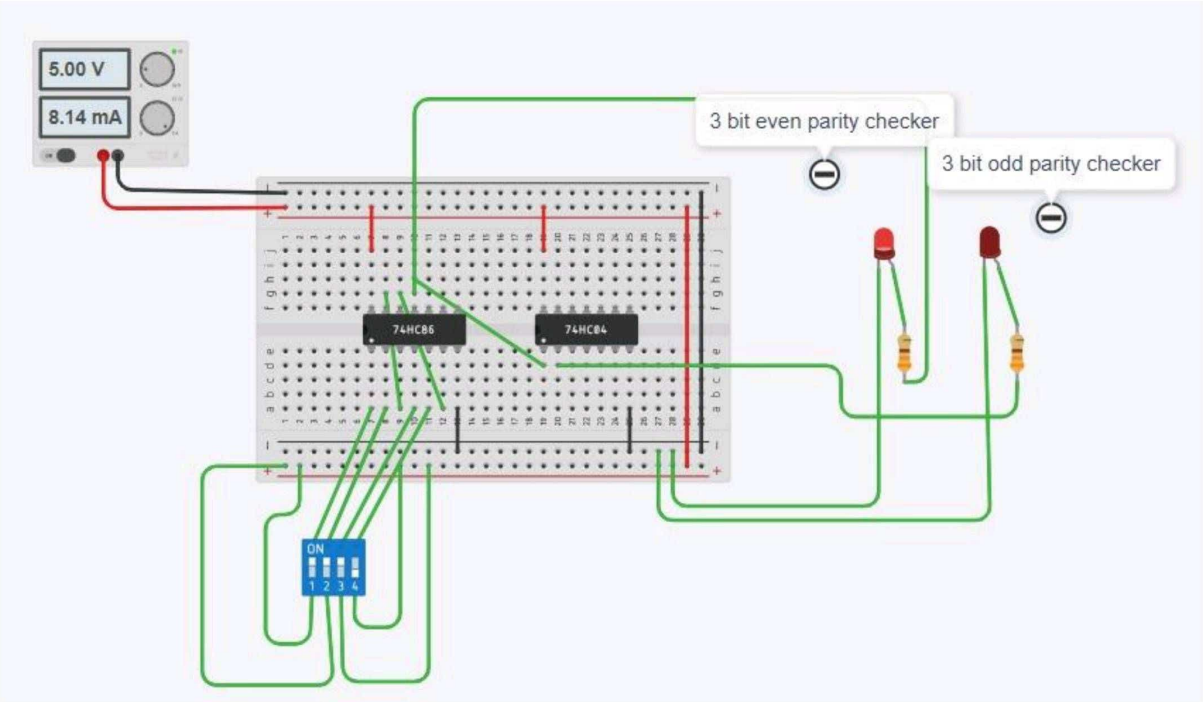
$PEO_2 = PB_2 \oplus B_1 \oplus B_2$



$$PEO_1 = \bar{A}\bar{B}(\bar{C}D + C\bar{D}) + \bar{A}B(\bar{C}\bar{D} + CD) + DB(C\bar{D} + \bar{C}D) + AB(\bar{C}\bar{D} + CD)$$
$$= \bar{A}\bar{B}(C \oplus D) + \bar{A}B(\overline{C \oplus D}) + AB(C \oplus D) + A\bar{B}(\overline{C \oplus D})$$
$$= (A \oplus B) \oplus (C \oplus D)$$

Conclusion :- 3 bit even as well odd parity checker and generator we studied.

PARITY CHECKER



PARITY GENERATOR