



# ASSIGNMENT 6

[Design of a combinational logic circuit for ODD/EVEN PARITY GENERATOR AND CHECKER using  
2 input NAND GATES]

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Expt. No. 6

Date	
Page	

Objective:- To implement an odd/even parity checker and generator using only 2-input NAND gates.

Theory:- In even parity bit scheme, the parity bit is 0 if there are even number of 1s in the data stream and is 1 if there are odd number of 1s in the data stream. In odd parity bit scheme, the parity bit is 1 if there are even number of 1s in the data stream and is 0 if there are odd number of 1s in the data stream.

A parity generator is a combinational logic circuit that generates the parity bit.

A parity checker can detect errors in data transmission by checking the parity.

Even Parity Generator:-

Truth Table:-

3 input message			Parity Bit
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

Onward

Teacher's Signature.....

Expt. No.

Date	
Page	

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

$$P = A'B'C + A'BC' + AB'C' + ABC$$

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

$$[P = A \oplus B \oplus C]$$

ODD Parity Generator :-

Truth Table :-

3 input message			Parity Bit
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

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

$$P = A'B'C' + AB'C' + A'BC + ABC'$$

$$[P = A \oplus B \oplus C]$$

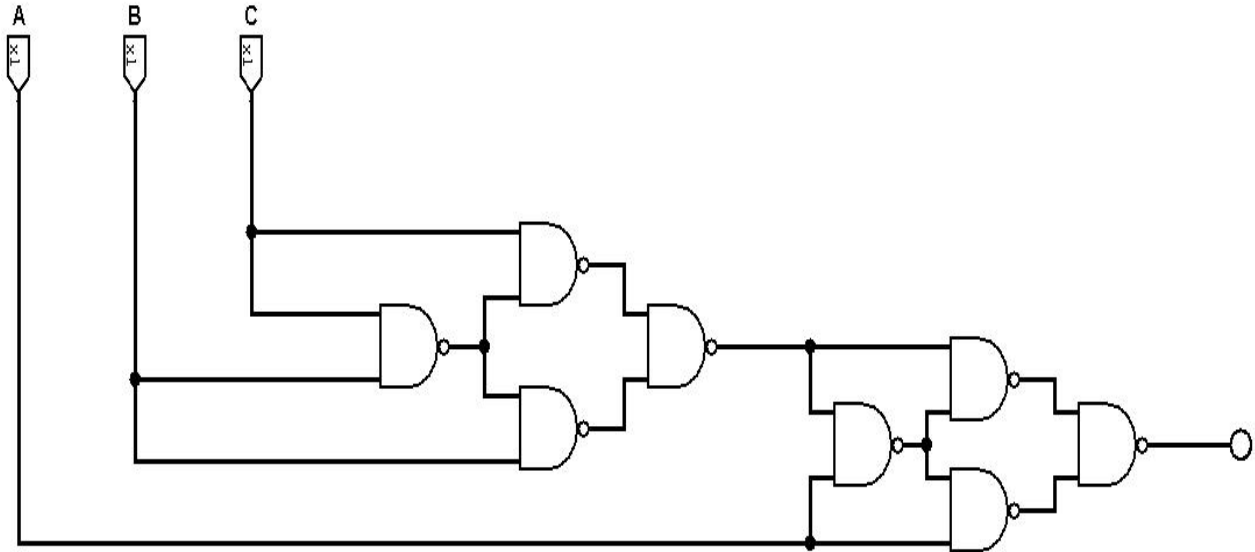
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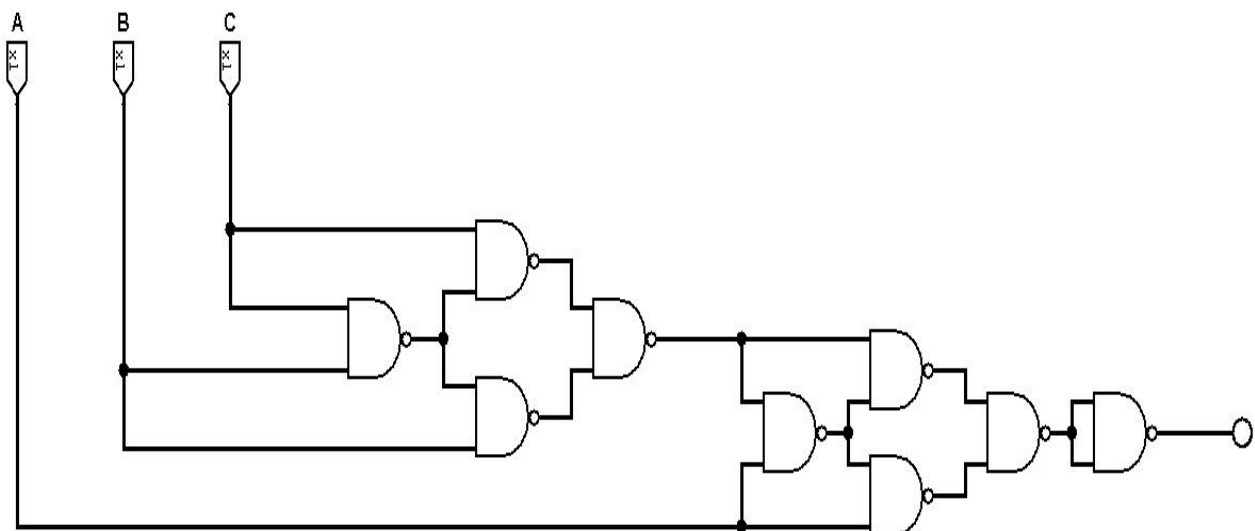
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## CIRCUIT DIAGRAM:

**EVEN PARITY GENERATOR:**



**ODD PARITY GENERATOR:**





Expt. No.

Date	
Page	

### Even Parity Checker:-

Truth Table:-

4 bit message

Parity Checker

A	B	C	P	PC
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

AB \ CP	00	01	11	10
00	0	1	0	1
01	1	0	1	0
11	0	1	0	1
10	1	0	1	0

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

Teacher's Signature.....

Expt. No.

Date	
Page	

### ODD Parity Checker:-

#### Truth Table:-

4 bit message				Parity checker
A	B	C	P	PC
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

AB \ CP	00	01	11	10
00	1	0	1	0
01	0	1	0	1
11	1	0	1	0
10	0	1	0	1

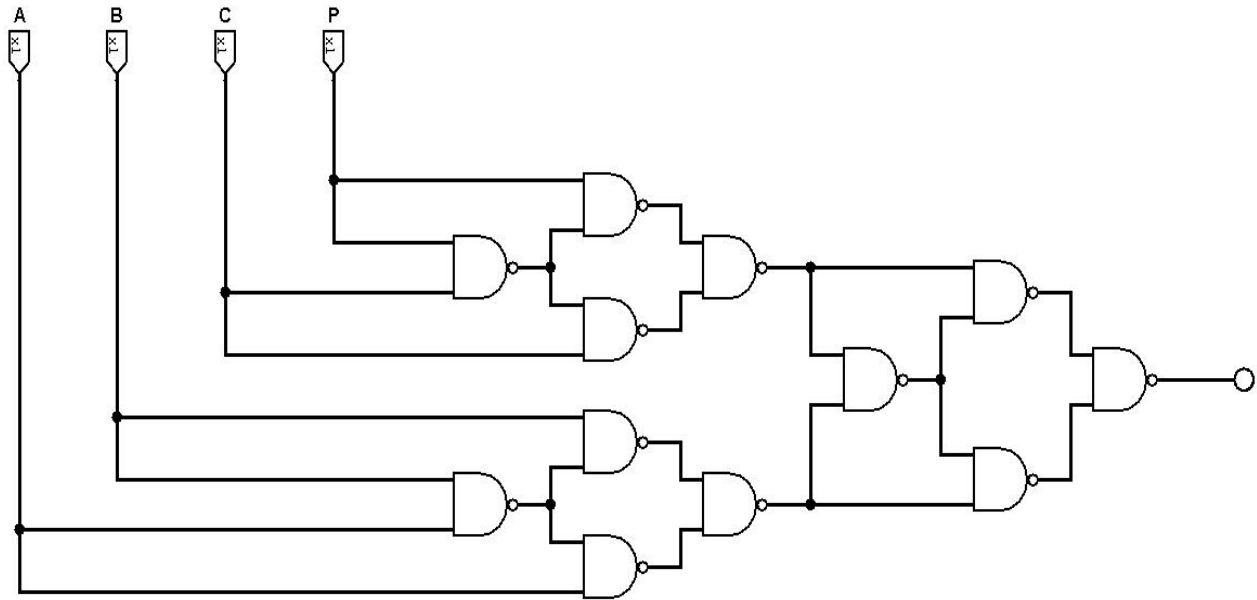
$$PC = (A \oplus B) (C \oplus P)$$

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## CIRCUIT DIAGRAM:

### EVEN PARITY CHECKER:



### ODD PARITY CHECKER:

