SNS COLLEGE OF TECHNOLOGY

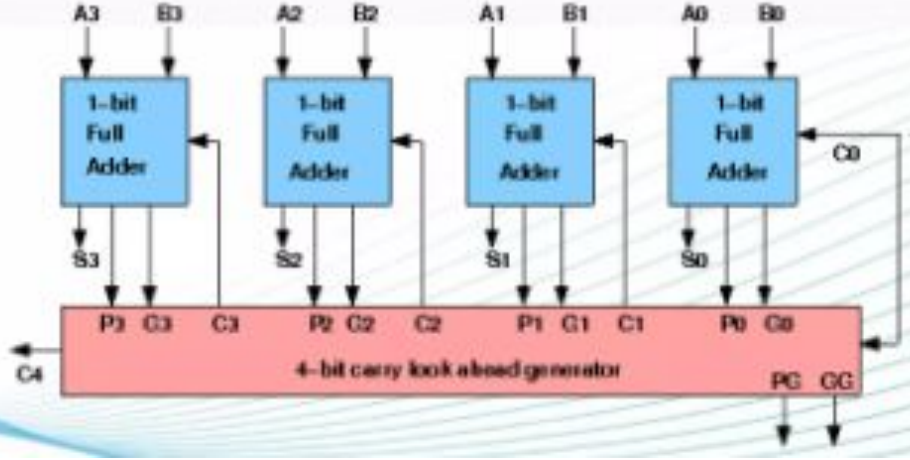
(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

19ECB231/ Digital Electronics

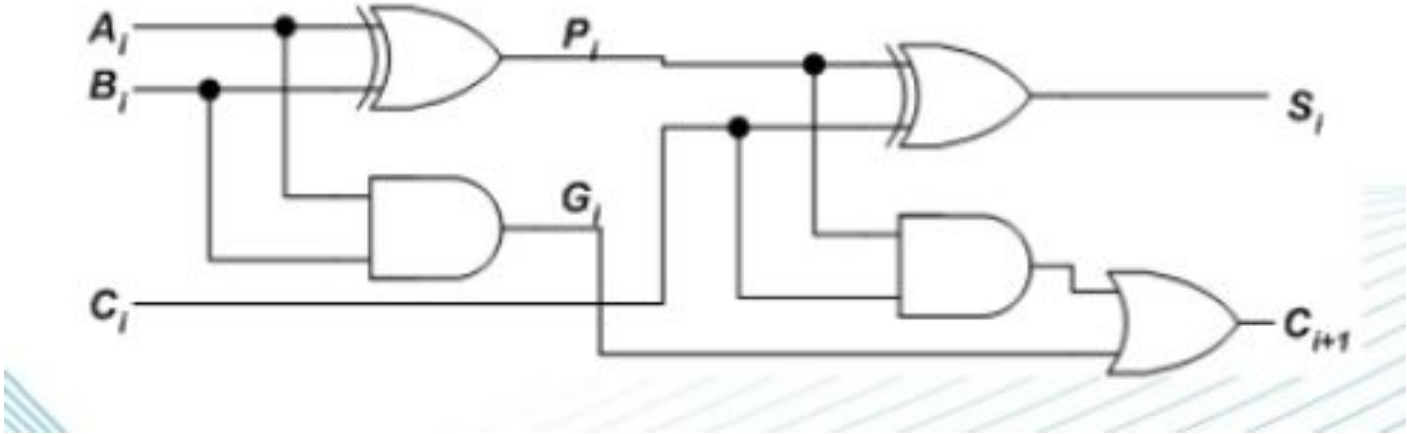
Fast Adder - Carry Look Ahead adder

INTRODUCTION:-

A look ahead carry adder is fast adder which improves speed by reducing the amount of time required to determine carry bits. It reduces the time which are delayed at each stage.



FULL ADDER CKT TO SHOW CARRY GENERATION AND PROPAGATION



TRUTH TABLE OF FULL ADDER TO SHOW CARRY GENERATION AND

	INPUT			OUTPUT		
Row	A	B	C_{in}	Sum	C_{out}	
0	0	0	0	0	0	No carry generation $C_{out}=0$
1	0	0	1	1	0	
2	0	1	0	1	0	Carry propagation $C_{out} = C_{in}$
3	0	1	1	0	1	
4	1	0	0	1	0	
5	1	0	1	0	1	
6	1	1	0	0	1	Carry generation $C_{out} = 1$
7	1	1	1	1	1	

EXPRESSION FOR CARRY GENERATION AND PROPAGATION

- From truth table , carry generation in row 6^{th} and 7^{th} is given by :-

$$G_i = A_i B_i$$

- Similarly the carry propagation Pi occur with either Ai= 1 and Bi= 0 or vice versa

$$P_i = A_i \oplus B_i$$

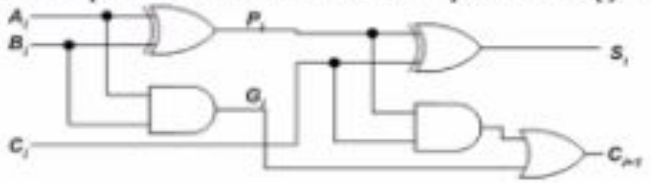
Gi is known as the carry Generate signal

Pi is known as the carry propagate signal

- The new expressions for the output sum and the carryout are given by:-

$$S_i = P_i \oplus C_{i-1}$$

$$C_{i+1} = G_i + P_i C_i$$

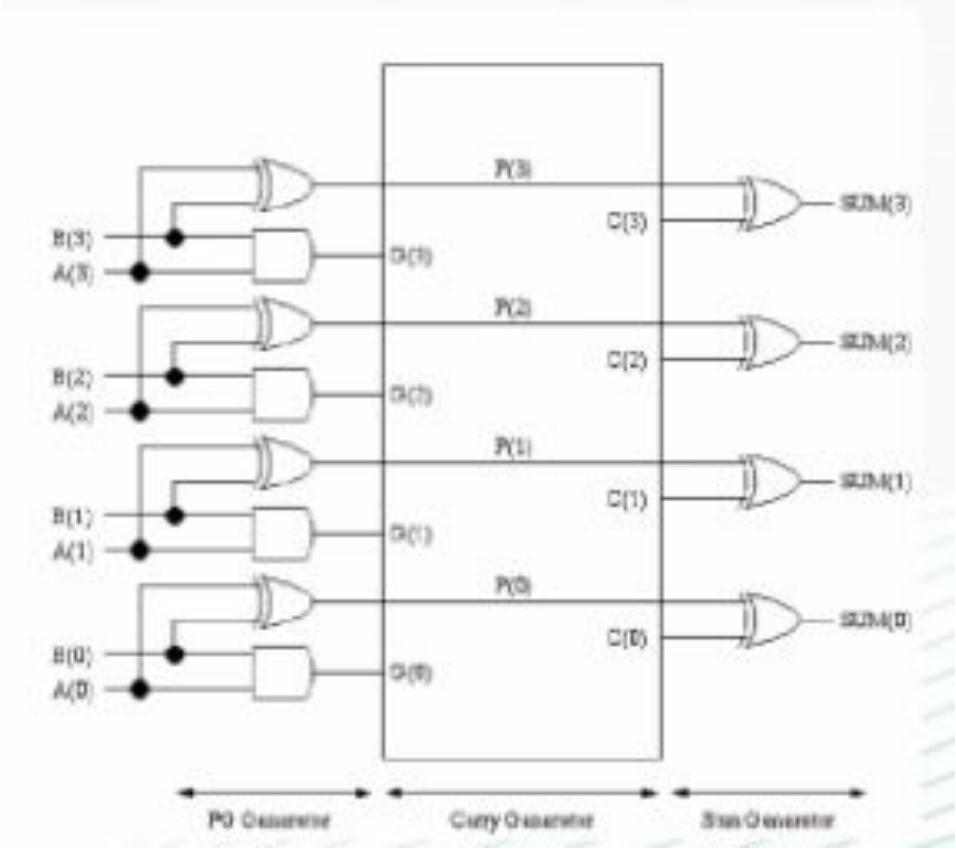


❖ Boolean expression of the carry outputs of various stages

$$C_1 = G_0 + P_0C_0$$
$$C_2 = G_1 + P_1C_1 = G_1 + P_1 (G_0 + P_0C_0) = G_1 + P_1G_0 + P_1P_0C_0$$
$$C_3 = G_2 + P_2C_2 = G_2 + P_2G_1 + P_2P_1G_0 + P_2P_1P_0C_0$$
$$C_4 = G_3 + P_3C_3 = G_3 + P_3G_2 + P_3P_2G_1 + P_3P_2P_1G_0 + P_3P_2P_1P_0C_0$$

The general expression is :------

$$C_{i+1} = G_i + P_iG_{i-1} + P_iP_{i-1}G_{i-2} + \ldots\ldots P_iP_{i-1}\ldots P_2P_1G_0 + P_iP_{i-1}\ldots P_1P_0C_0.$$


P(3)
C(3)
SUM(3)
B(3)
A(3)
P(2)
C(2)
SUM(2)
B(2)
A(2)
P(1)
C(1)
SUM(1)
B(1)
A(1)
P(0)
C(0)
SUM(0)
B(0)
A(0)


RECAP


Thank You!