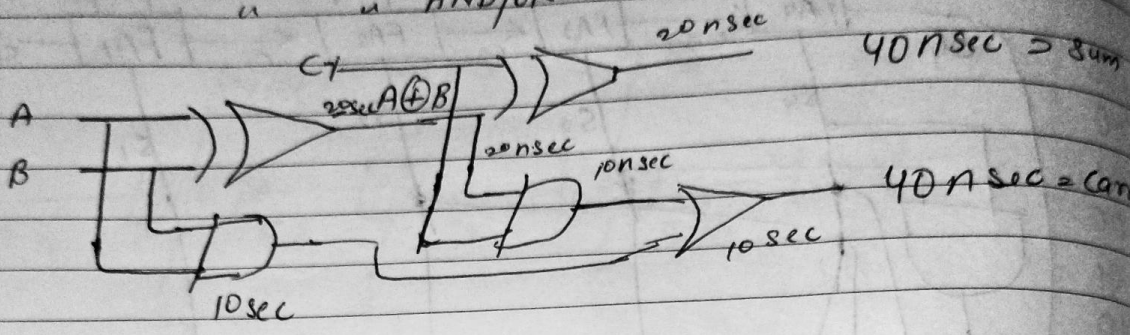
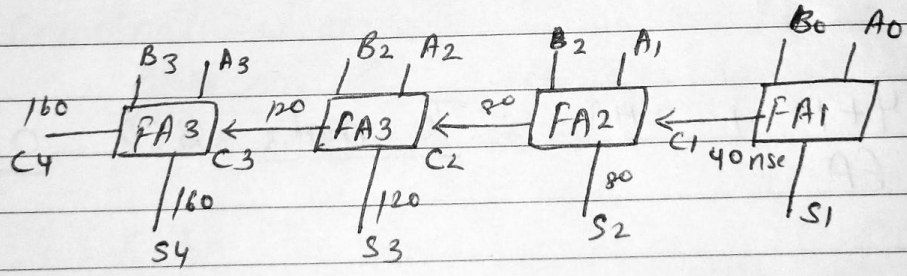
Look ahead carry L-26

* Consider an implementation of F.A using 2 HA
  → delay of XOR — 20 nsec
  " " AND/OR — 10 nsec



Total delay 40 sec

* 4 bit parallel adder — Total delay?
  — 1FA = 40 nsec



160 nsec

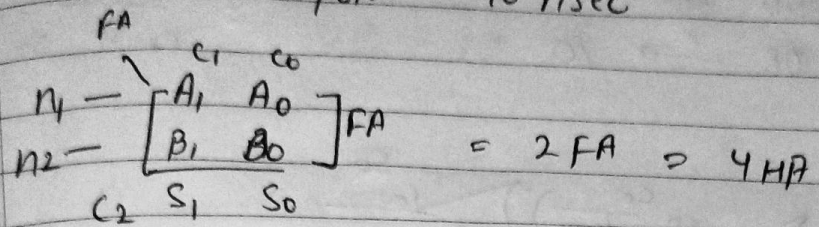
1FA delay

n bit parelled adder = m × n

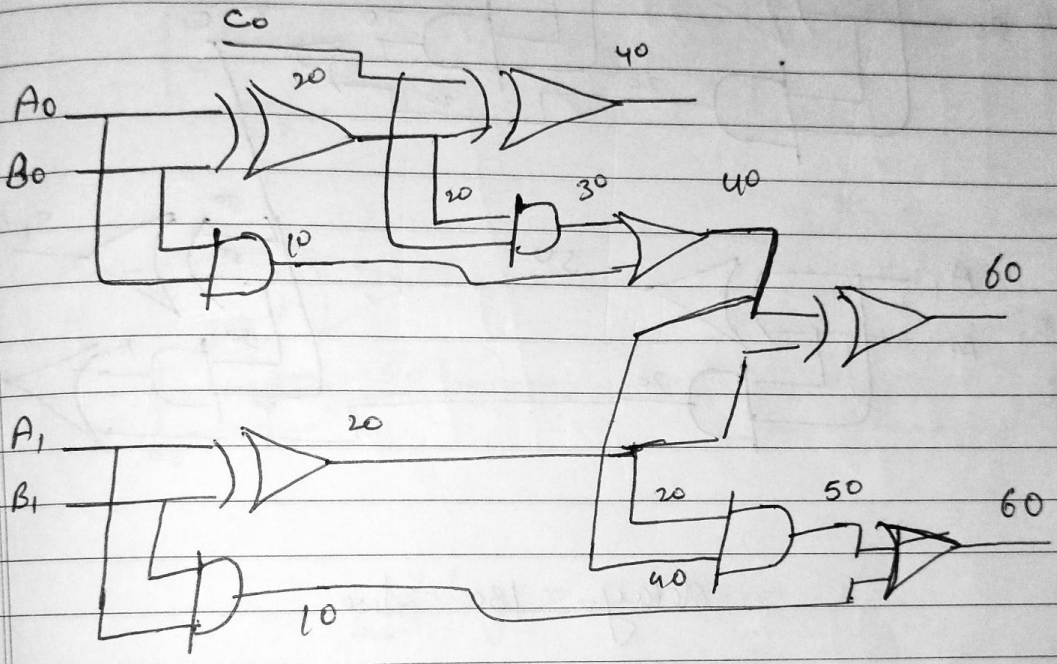
2 bit parallel adder implemented using HA

XOR — 20 nsec

AND/OR — 10 nsec



= 2 FA = 4 HA



Total delay 60 nsec

2bit parallel adder → delay?

HA

XOR → 50 nsec

AND → 20 "

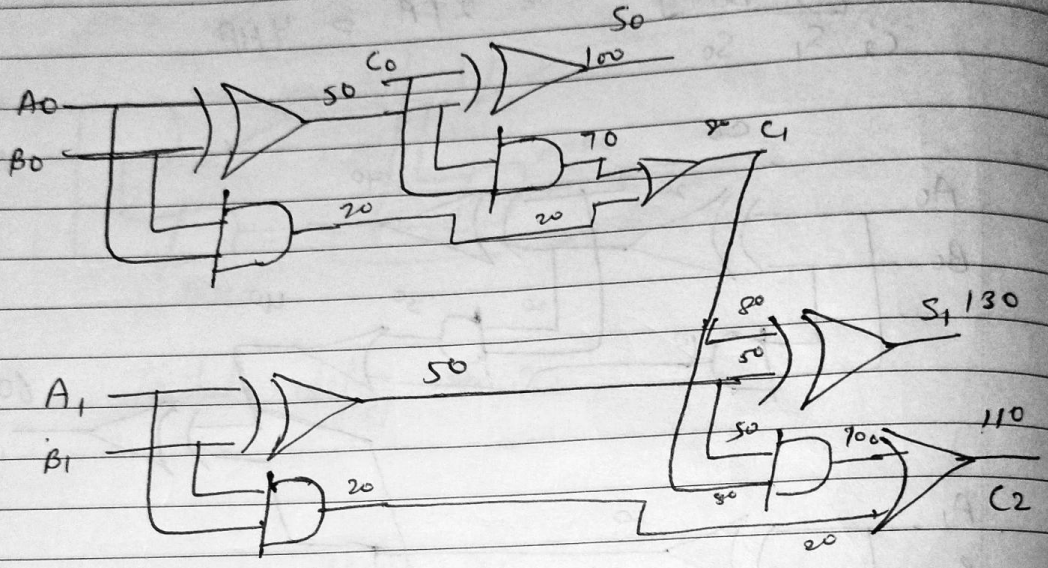
OR → 10 "

C1 C0

n1 → A1 A0

n2 → B1 B0

C2 S1 S0



delay = 130 Ans

2bit parallel adder

HA

XOR - 30

AND - 50

OR - 10

C_0 C_1

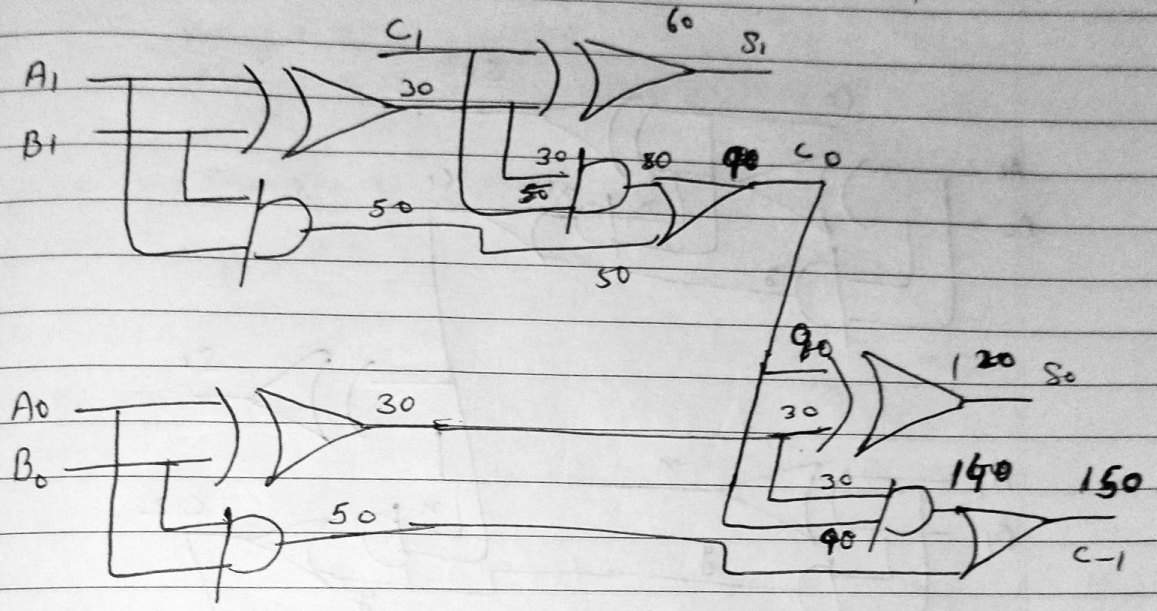
$n_1 \rightarrow$ A_0 A_1

B_0 B_1

C_{-1} 50 S_1

↓ ↓ ↓

180 120 60



delay = 150 Ans

n+1 Blocks

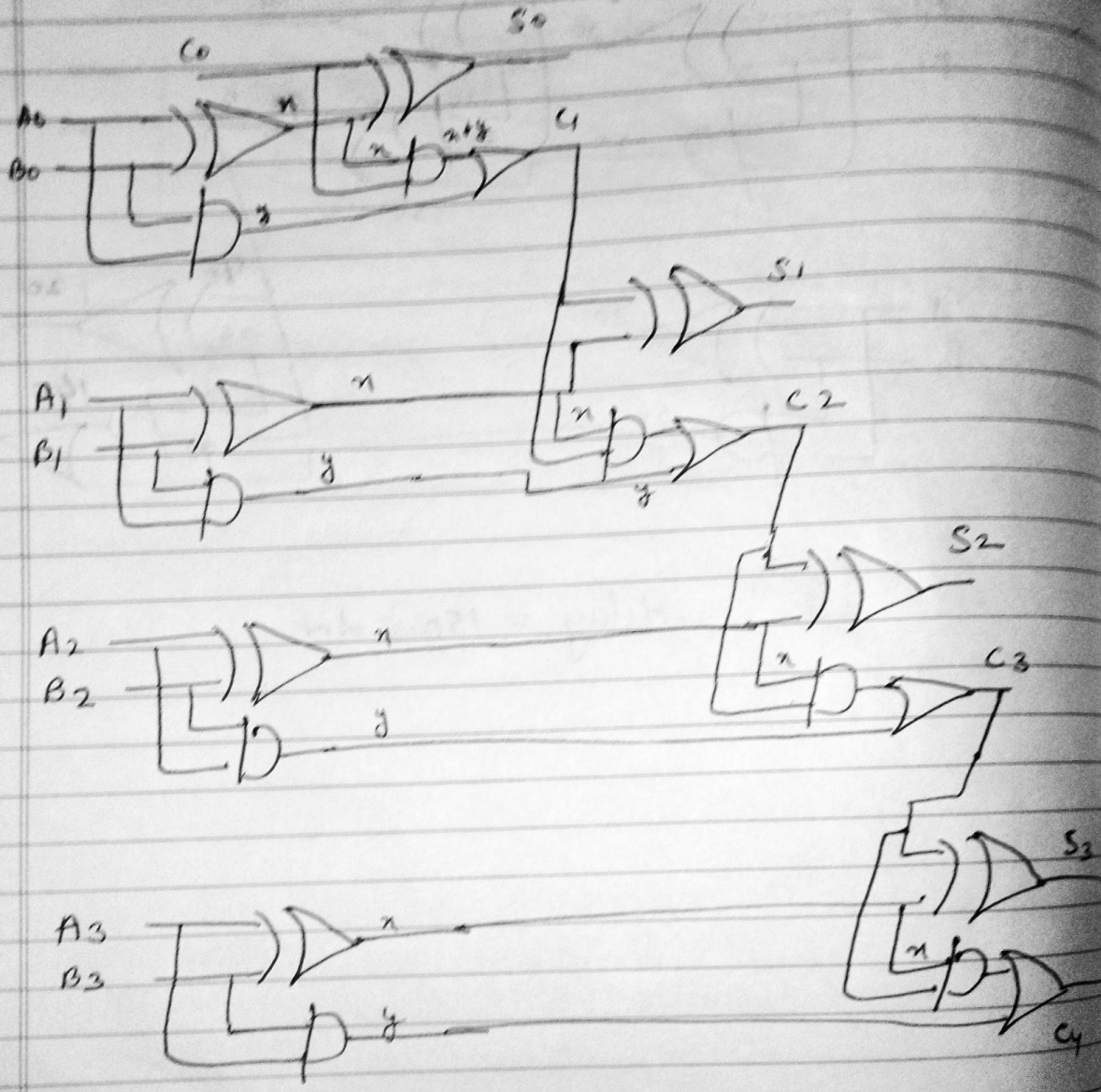
'n' bit parallel adder

XOR — x
AND — y
OR — z

only HA

C_4 C_3 C_2 C_1 C_0
n_1 — B_3 A_2 A_1 A_0
B_3 B_2 B_1 B_0

C_4 S_3 S_2 S_1 S_0



S_0 — $2x$

C_1 — $x+y+z$

S_1 — $x+y+z+x$ (y+z)

C_2 — $x+y+z+y+z$

S_2 — $x+y+z+y+z+x$ (y+z)

C_3 — $x+y+z+y+z+y+z$

$S_3 \rightarrow x+y+z+y+z+y+z+x$ (y+z)

$C_4 \rightarrow x+y+z+y+z+y+z+y+z$

Ans 2

S_0 — $2x$

C_1 — $x+y+z$

Total delay = $S = 2x\,(n-1)^*(y+z)$

$C = x+y+z\,(n-1)^*(y+z)$

Formula for n bit parallel adder only using H.A Ans

Total delay of n bit parallel adder if it is implemented using H.A only & delay of XOR — x, AND — y and OR — z

Sum = $2x\,(n-1)\,(y+z)$

Carry = $x+y+z\,(n-1)\,(y+z)$

Sum = $2x + (n-1)(y+z) \Rightarrow x + \boxed{x + (n-1)(y+z)}$

Carry = $x+y+z\,(n-1)(y+z) \Rightarrow x + \boxed{(y+z)(n-1)(y+z)}$

diff

if $x > y+z$, sum will decide the total delay

else if $y+z > x$, Carry will decide the total delay

else "any of them"

---

4 bit parallel adder only using H.A

XOR – 50, AND – 30, OR = 20

Sum = $2x + (n-1)(y+z)$

$= 100 + 3 \times 50$

$= 250$ nsec

Carry = $x+y+z+(n-1)(y+z)$

$= 50 + 20 + 30 + 3 \times 50$

$= 250$ nsec

---

8 bit parallel adder

XOR → 20, AND → 50, OR → 10

Sum = $2mn + (n-1)(y+2)$

$40 + 7 \times 60 = 460$

Carry = $x+y+2 + (n-1)(y+2)$

$80 + 7 * 60 = 500$ Ans

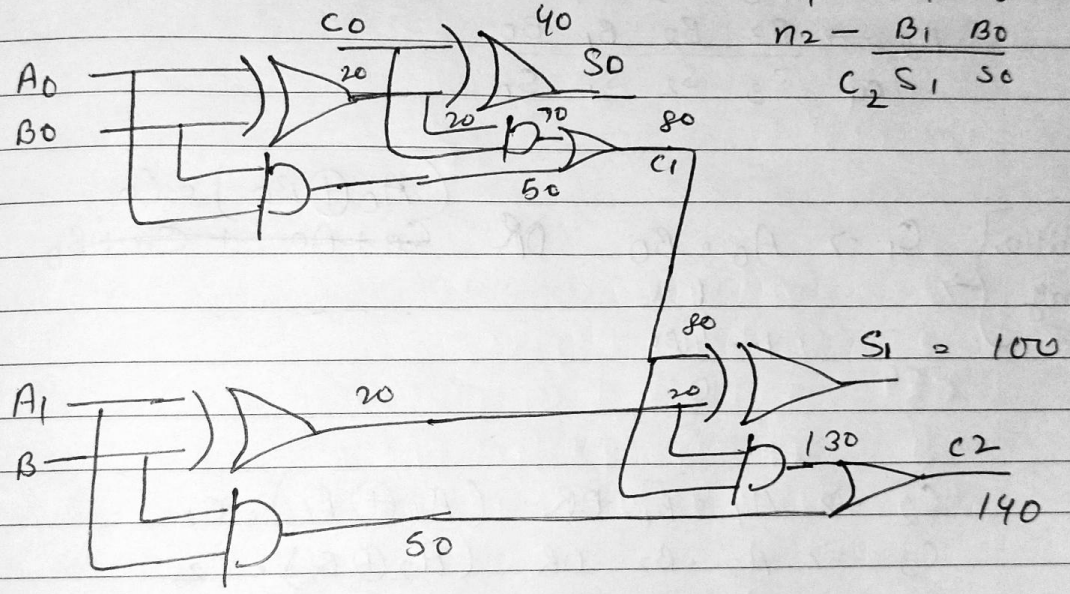
Total delay = 500

Same ans without using formula c_1 c_0

$n_1 - A_1\ A_0$

$n_2 - B_1\ B_0$

$C_2\ S_1\ S_0$



$S_0 = 40$ 60 diff

$C_1 = 80$

$S_1 = 100$ 60 diff

$C_2 = 140$

$S_0 \rightarrow 40 * 60 \times 7 = 460$

$C \quad 80 * 60 \times 7 = 500$

Ans