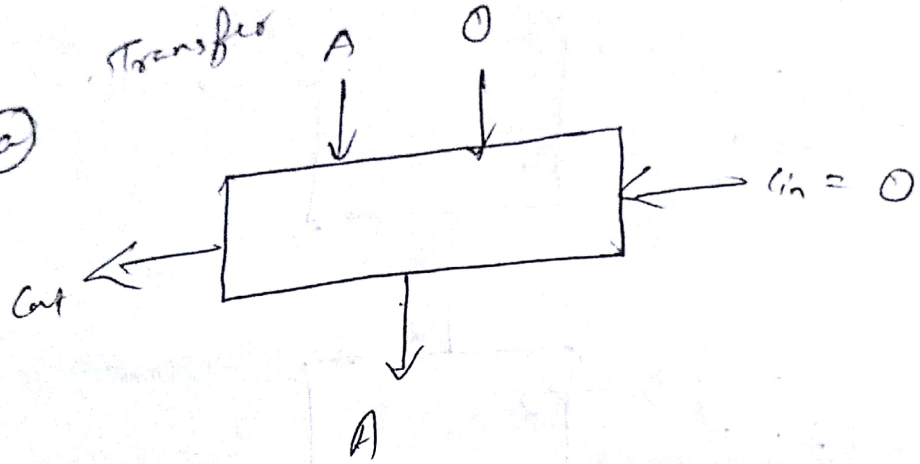
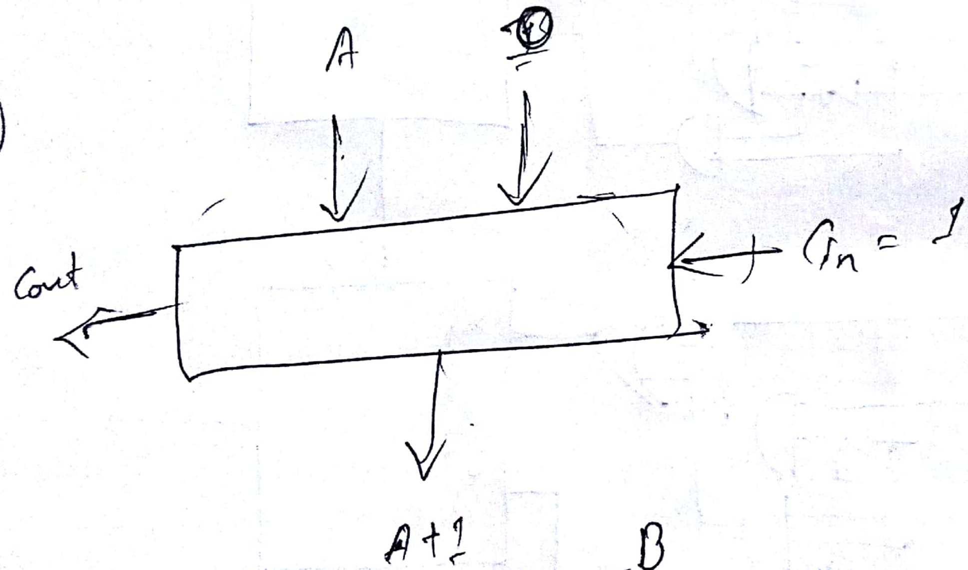
Arithmetic Part:

Transfer

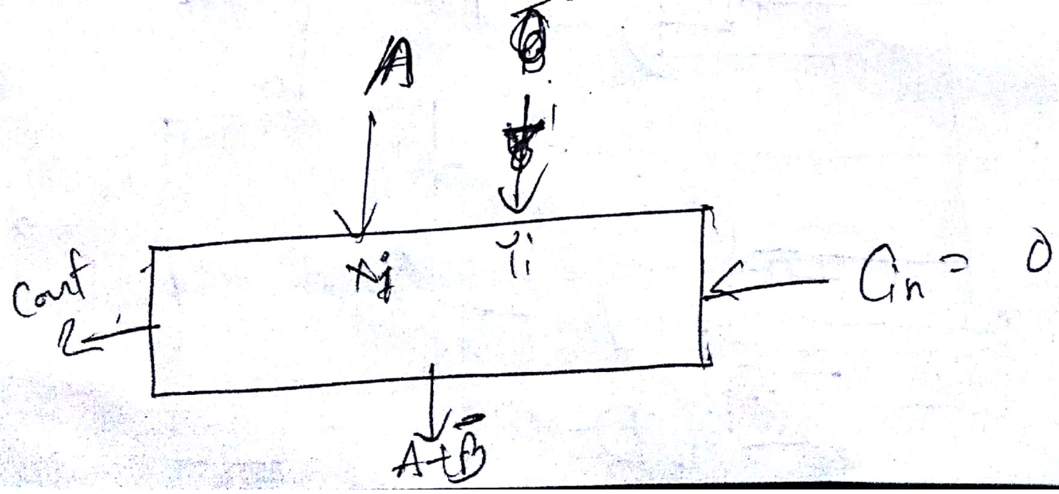
(a)



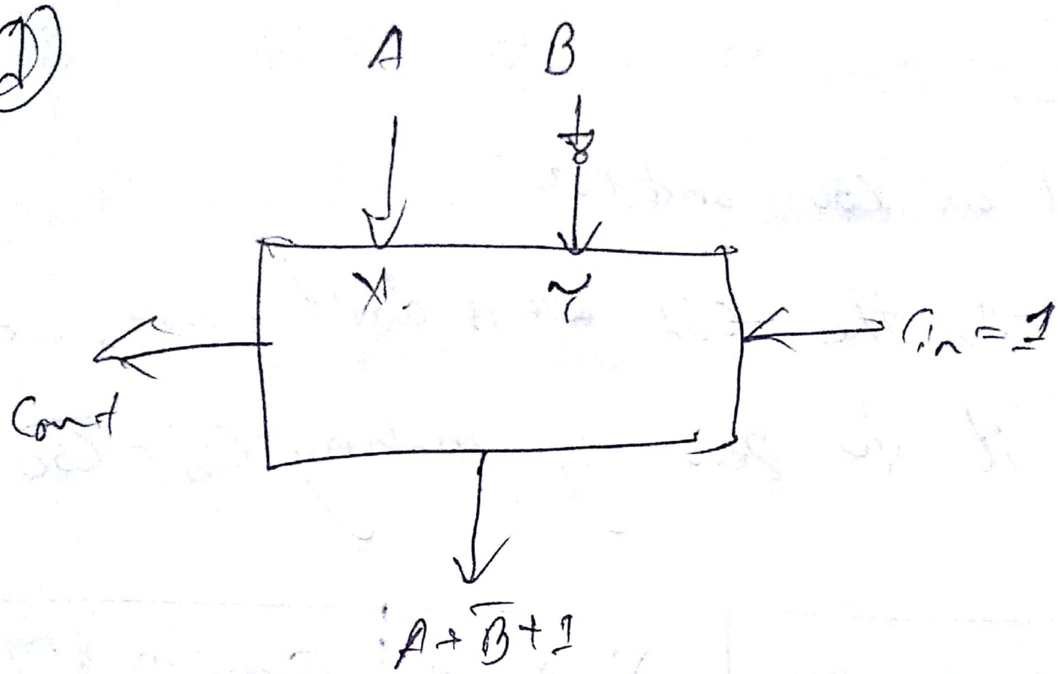
(b)



(c)



2



CS2	CS1	Y
0	0	0
0	1	0
1	0	$\overline{B}$
1	1	$\overline{B}$

$$Y_i = CS2\,\overline{B} + CS2\,CS1\,\overline{B}$$

$$= CS2 . \overline{B}_i$$

$$X_i = A_i$$

Logical Part:

Dependent on CS0 and CS1

When CS0 = 1, the CS1 is don't-care. We can force it to zero by making $C_{in} = \overline{CS0}\, CS1$.

Now,

CS2	CS1	CS0	X_i	Y_i	C_i	Operation	Required operation
0	X	1	A_i	0	0	$F_i = A_i$ (Transfer)	OR
1	X	1	A_i	B_i'	0	$F_i = A_i \oplus B_i'$ (Equivalence	AND

So when CS2 CS0 = 01, we can OR B_i with A_i and the result will be A + B.

$\therefore X_i = A_i + CS2' \, CS0 \, B_i$

Again, when $CS2\,CS0 = 11$, here, we have to get AND operation where the output is equivalence.

$$F_i = A_i \oplus B_i'$$

$$= A_iB_i + A_i'B_i'$$

Let us investigate the possibility of ORing each input A_i with some boolean function K_i when $CS2\,CS1 = 11$.

$$F_i = X_i \oplus Y_i$$

$$= (A_i + K_i) \oplus B_i'$$

$$= A_iB_i + K_iB_i + A_i'K_i'B_i'$$

Taking $K_i = B_i'$, we get, $F_i = A_iB_i + B_i'B_i + A_i'B_iB_i'$

$$= A_iB_i$$

$$\therefore X_i = A_i + CS0\,CS2'B_i + CS0\,CS2\,B_i'$$

$X_i = A_i + CS0\,\overline{CS2}\,B_i + CS0\,CS2\,\overline{B_i}$

$Y_i = CS2\,\overline{B_i}$

$C_{in} = \overline{CS0}\,CS1$