

CSE 260 - Assignment - 03

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Section: 14

①

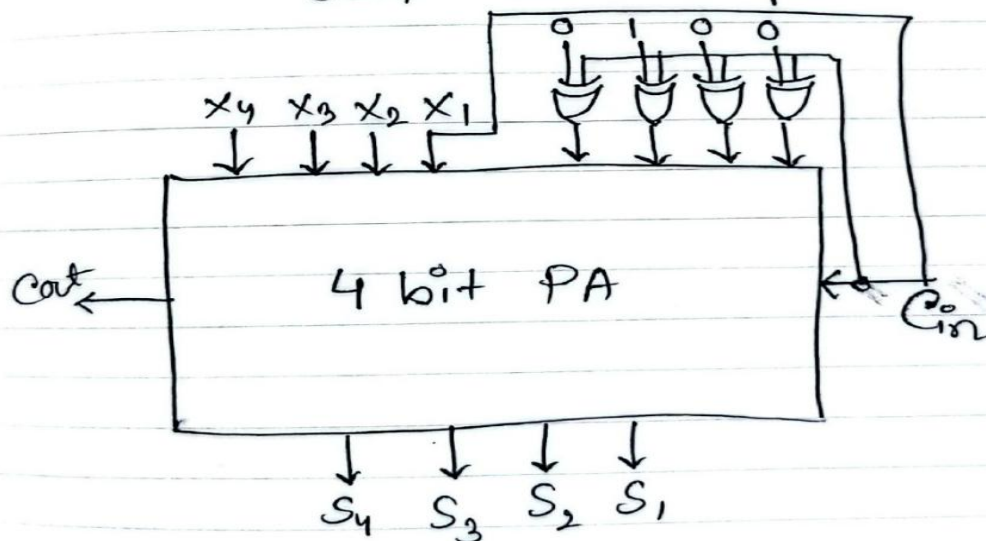
If $X_1 = 0$ then,

$C_{in} = 0$ and
output = $A + 4$

else,

$C_{in} = 1$ and
output = $A - 4$

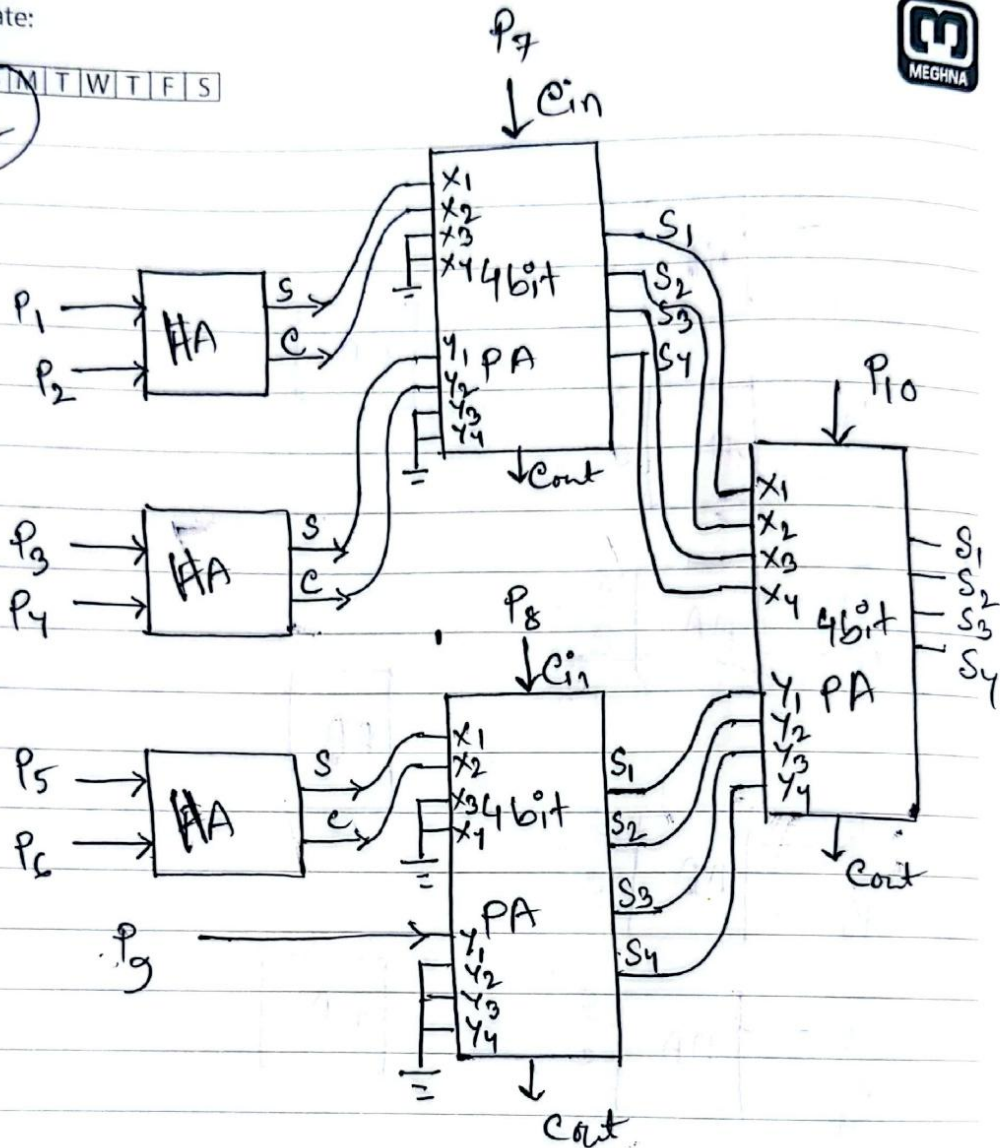
X_1	Y_1	C_{in}
even	0	0
odd	1	1



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2



bp



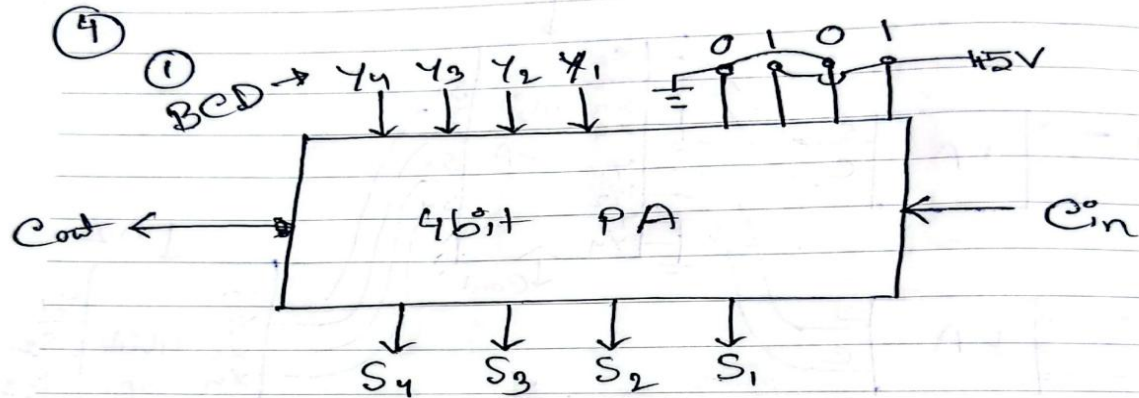
The diagram illustrates a 4-bit ripple-carry adder circuit. It is composed of three 4-bit Full Adders (FA) and two 4-bit Parallel Adders (PA).

- First Full Adder (FA1):** Takes inputs P_1, P_2, P_3 . It produces a sum output S_1 and a carry output C_1 .
- Second Full Adder (FA2):** Takes inputs P_4, P_5, P_6 . It produces a sum output S_2 and a carry output C_2 .
- Third Full Adder (FA3):** Takes inputs P_7, P_8, P_9 . It produces a sum output S_3 and a carry output C_3 .
- First Parallel Adder (PA1):** Takes inputs x_1, x_2, x_3, x_4 (where $x_1 = S_1, x_2 = S_2, x_3 = C_1, x_4 = C_2$). It produces outputs y_1, y_2, y_3, y_4 and a carry-out.
- Second Parallel Adder (PA2):** Takes inputs x_1, x_2, x_3, x_4 (where $x_1 = y_1, x_2 = y_2, x_3 = y_3, x_4 = C_3$). It produces outputs y_1, y_2, y_3, y_4 and a carry-out.

The final carry-out of the second PA is labeled P_{13} .

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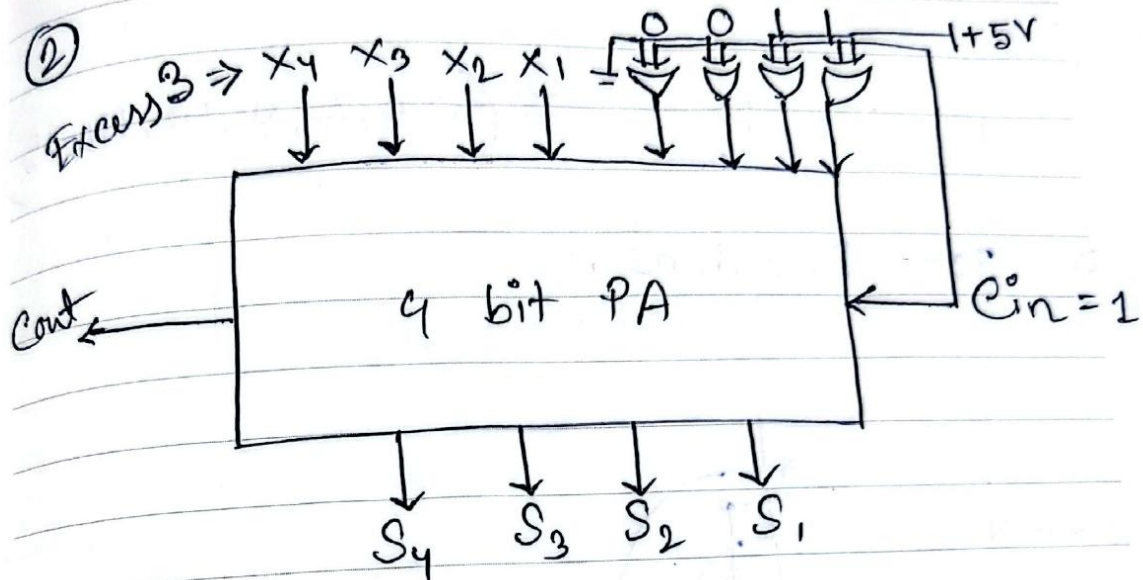
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Excess 5

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BCD

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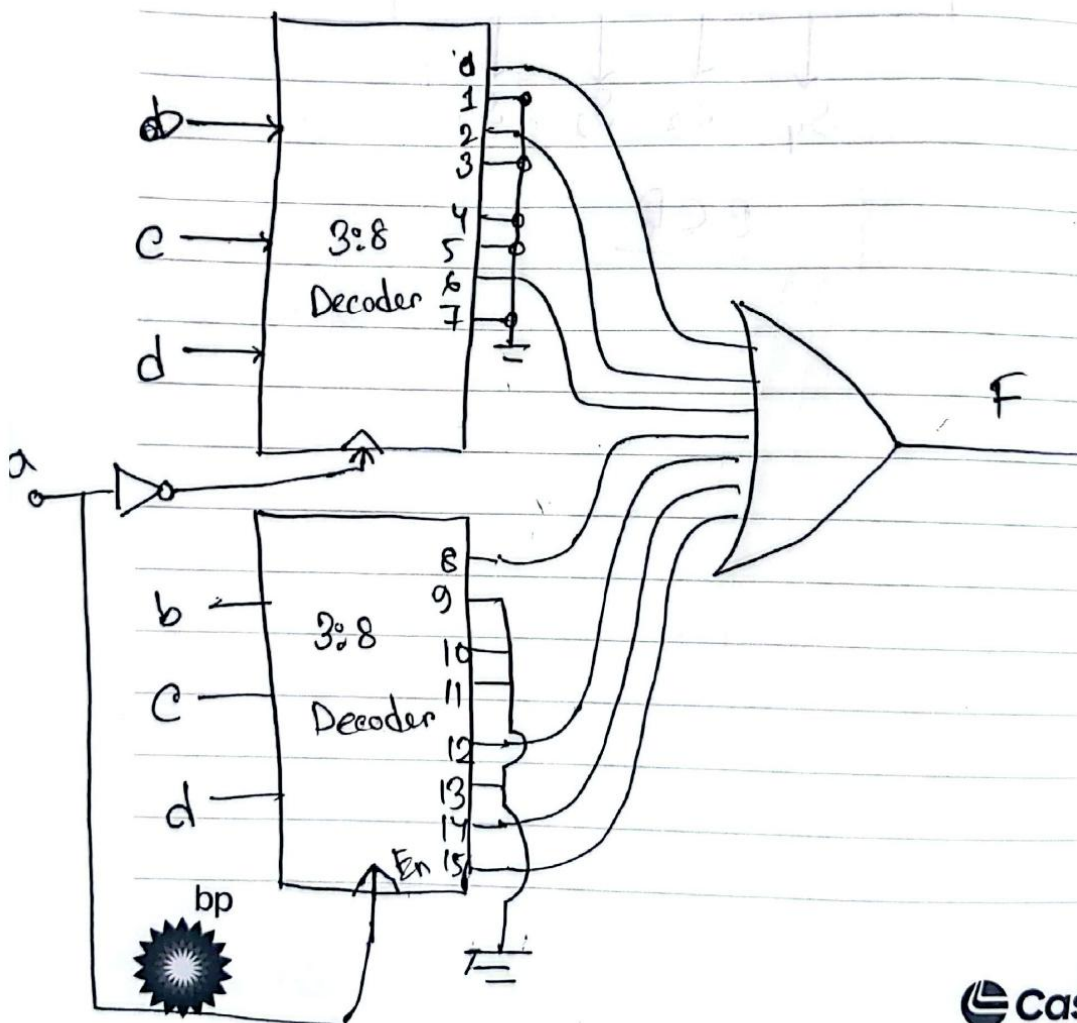
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5

$$F(a, b, c, d) = \sum(0, 2, 6, 8, 12, 14, 15)$$

Q 3:8 Decoders.

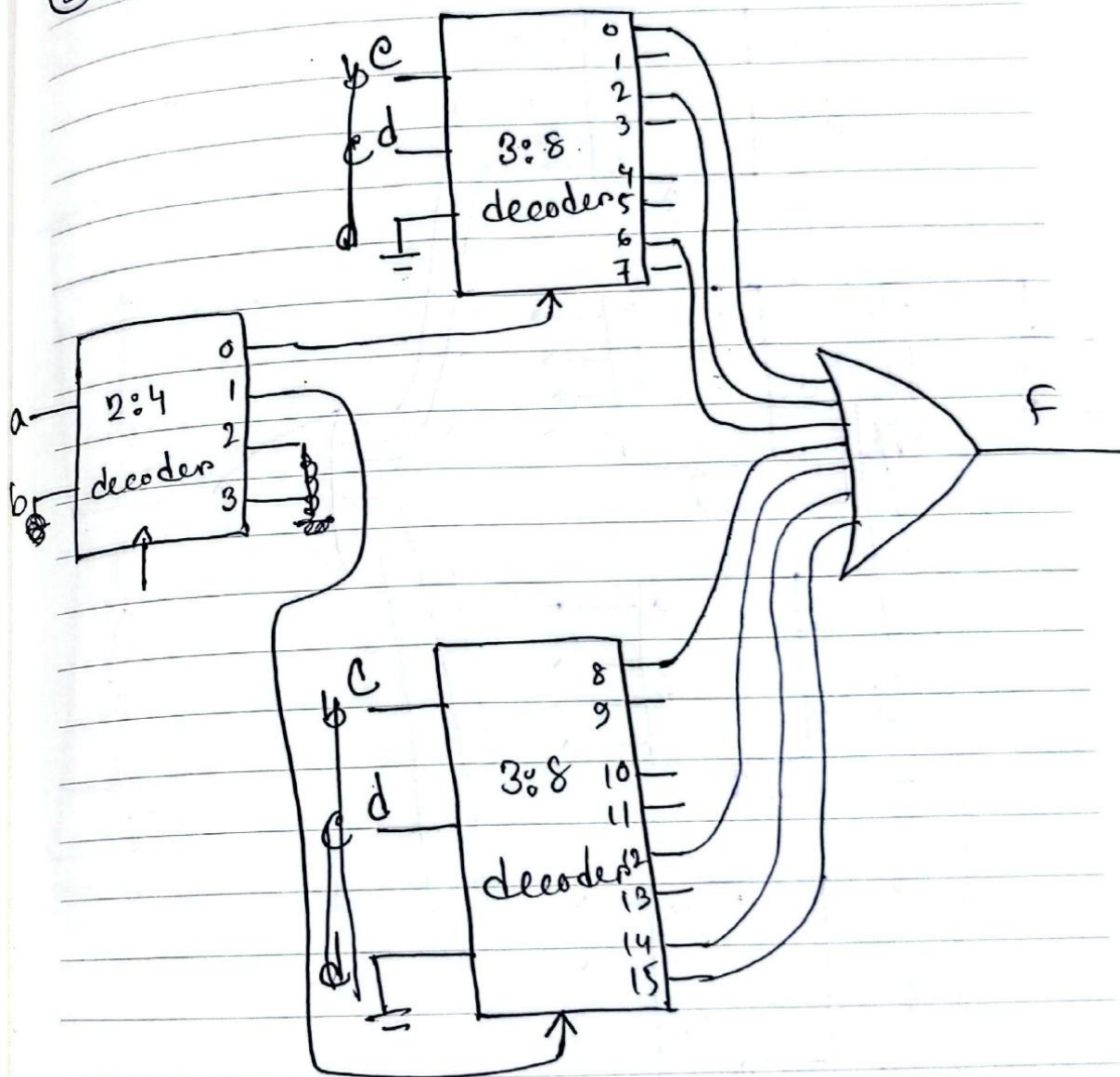


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(b) $F(a, b, c, d) = \sum (0, 2, 6, 8, 12, 14, 15)$



bp

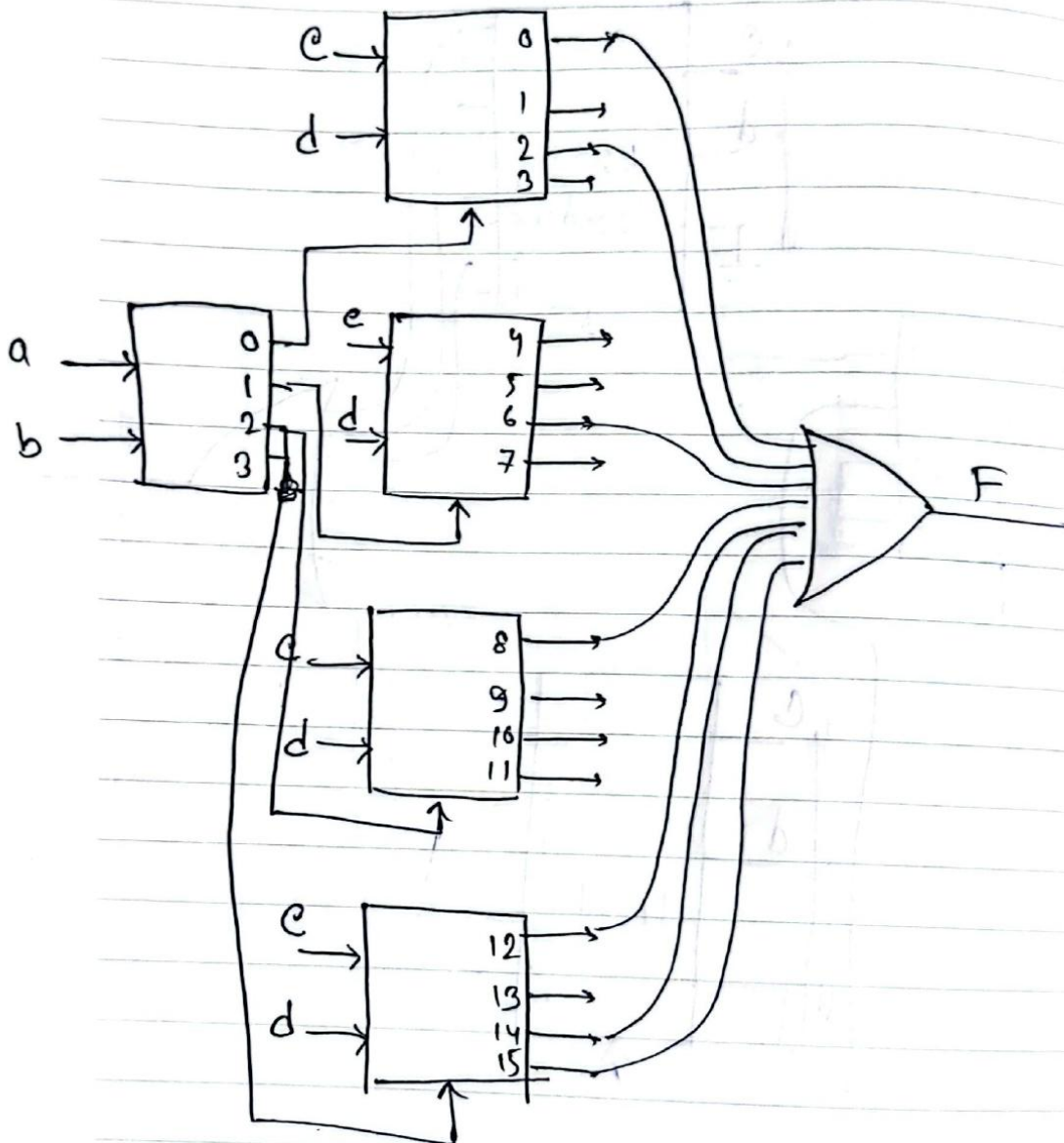


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© $F(a,b,c,d) = \Sigma(0,2,6,8,12,14,15)$



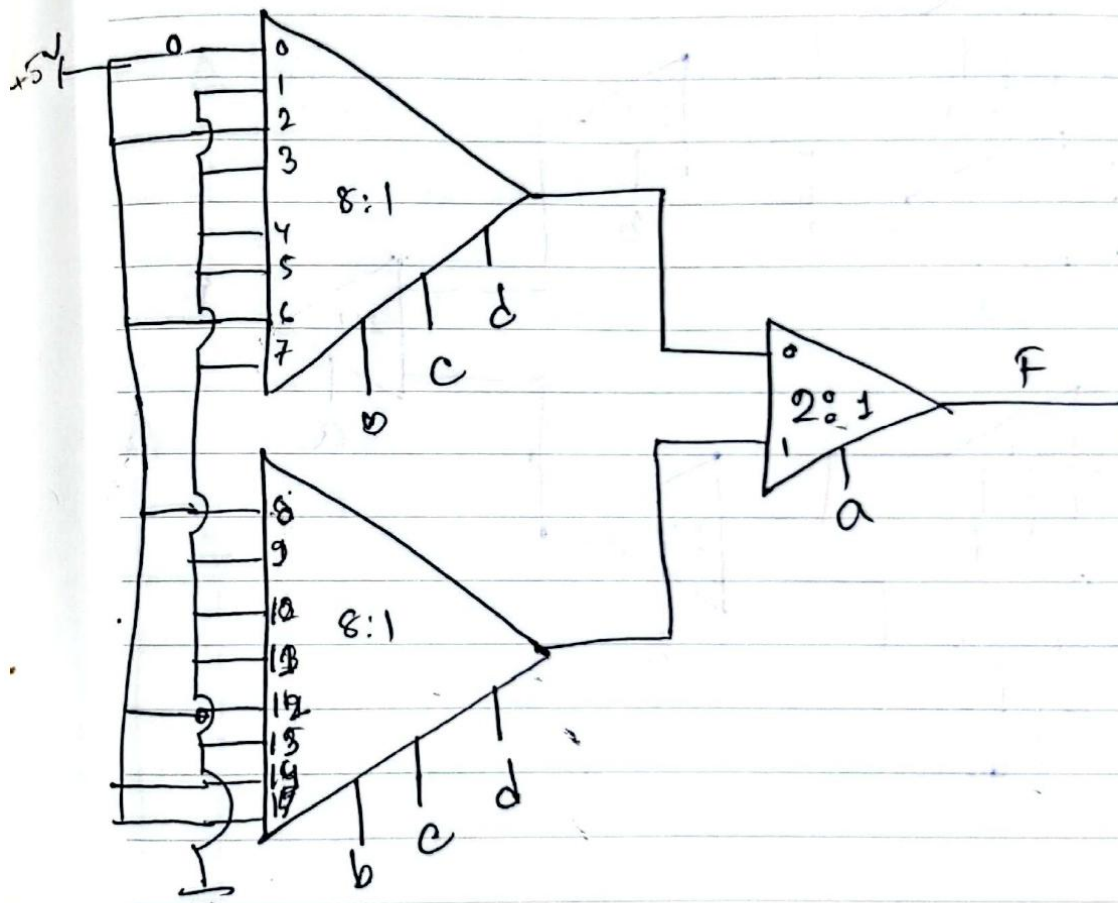
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8:1, 2:1



⑥ $F(a, b, c, d) = \sum (0, 2, 6, 8, 12, 14, 15)$



bp



Castrol

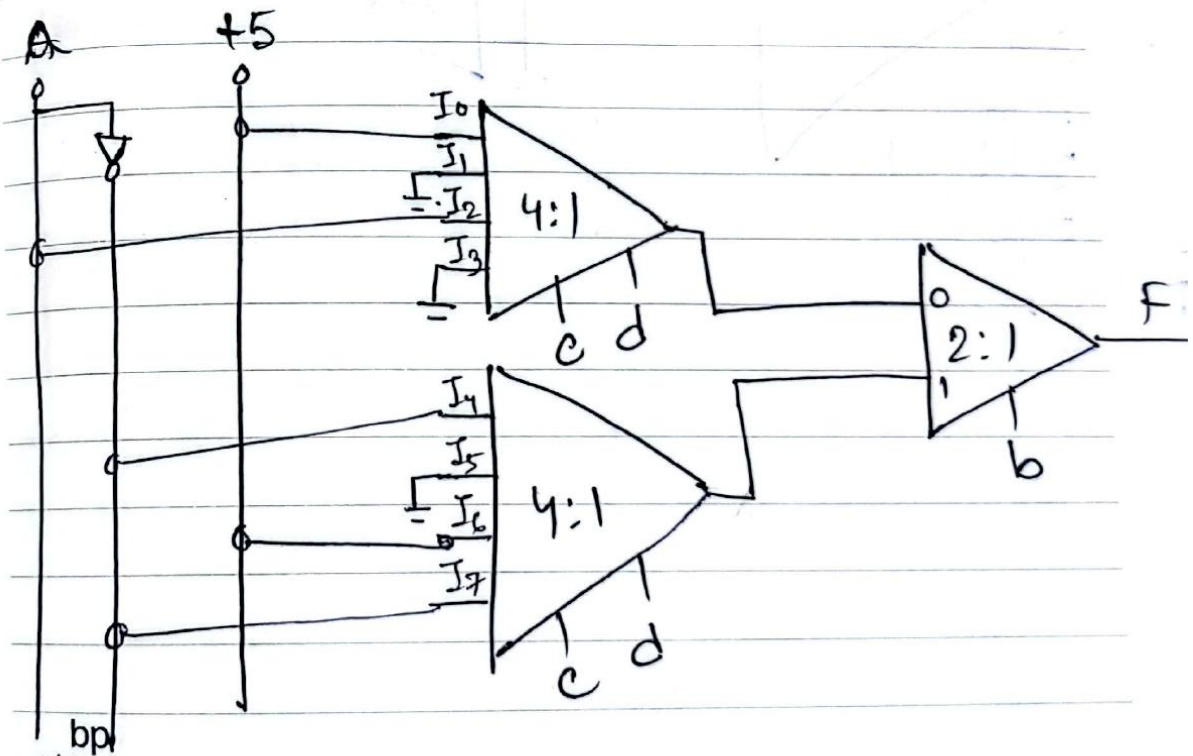
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⑥ $F(a,b,c,d) = \sum(0,2,6,8,12,14,15)$

	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
A	0	1	2	3	4	5	6	7
A'	8	9	10	11	12	13	14	15
	1	0	A	0	A'	0	1	A'



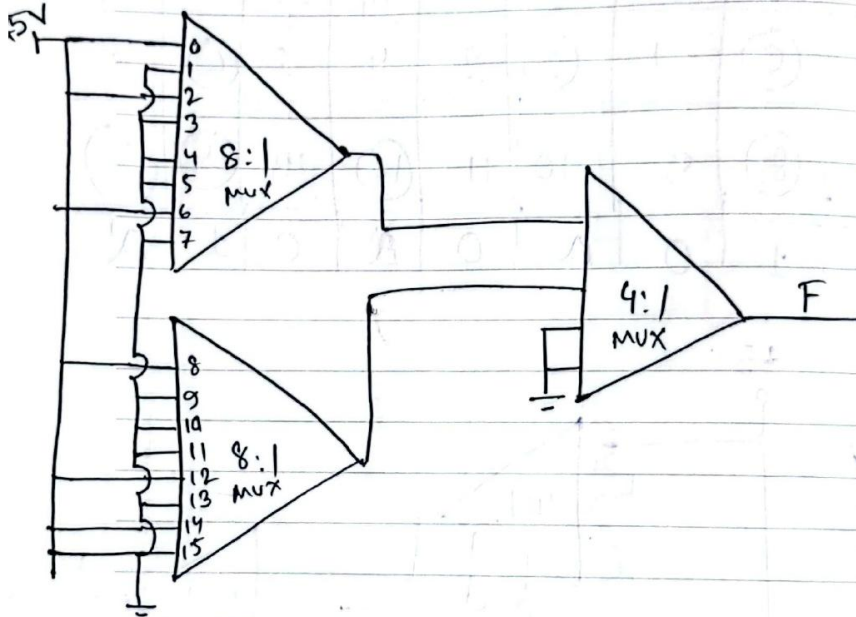
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8×1 , 4×1



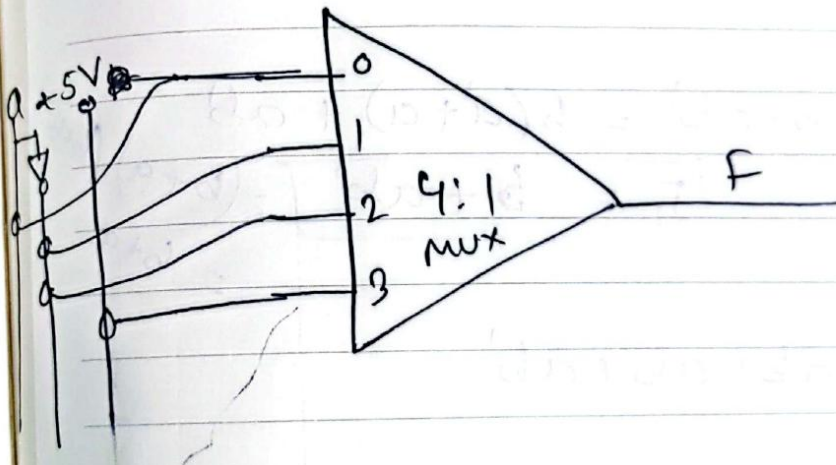
③ $F(a,b,c,d) = \sum (0, 2, 6, 8, 12, 14, 15)$



⑦ $F(a,b,c) = \sum (0, 3, 5, 6, 7)$

①

	I_0	I_1	I_2	I_3
a	①	1	2	③
a'	4	⑤	⑥	⑦
	a	a'	a'	1



(4x1)

(b) $F(a,b,c,d) = \sum(0,3,5,6,7,9,11,13,15)$

	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
$a'b$	0	1	2	3				
$a'b$	4	5	6	7				
ab	8	9	10	11				
ab'	12	13	14	15				

$I_0 = a'b'$

$I_1 = a'b + ab + ab' = b(a' + a) + ab$

$I_1 = b + ab'$

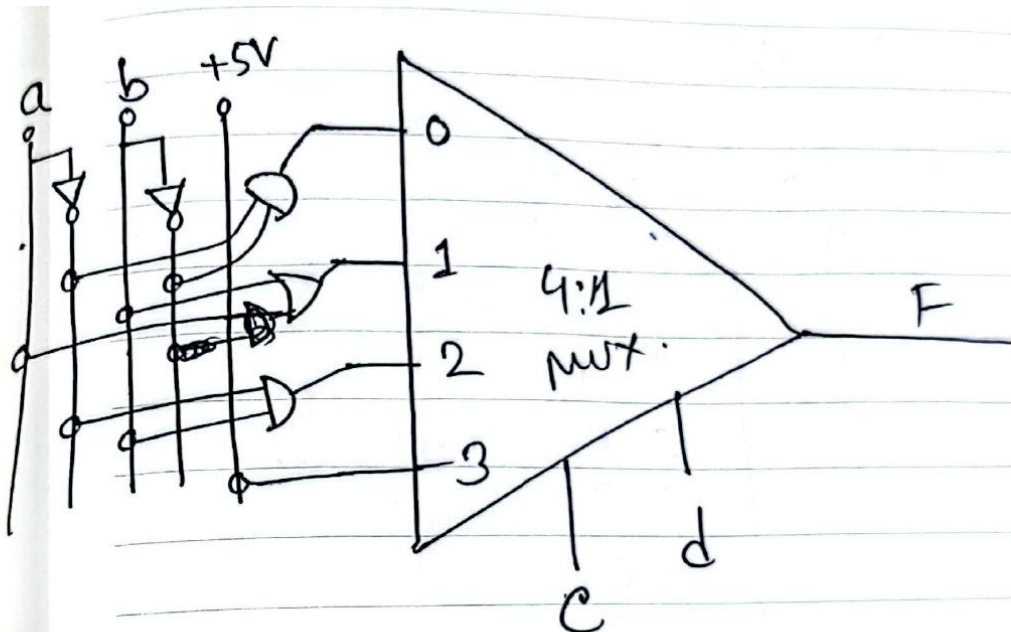
$= (b+a)(b+b')$
 $= b+a$

$I_2 = a'b$

$I_3 = a'b' + a'b + ab + ab'$

$= a' + a$

$I_3 = 1$



⑧

① Truth table:-

	I_3	I_2	I_1	I_0	A_1	A_0
0	0	0	0	0	x	x
1	0	0	0	1	0	0
2	0	0	1	0	0	1
3	0	0	1	1	0	1
4	0	1	0	0	1	0
5	0	1	0	1	1	0
6	0	1	1	0	1	0
7	0	1	1	1	0	0
8	1	0	0	0	1	1
9	1	0	0	1	1	1
10	1	0	1	0	1	1
11	1	0	1	1	0	0
12	1	1	0	0	1	1
13	1	1	0	1	0	0
14	1	1	1	0	0	1
15	1	1	1	1	1	1



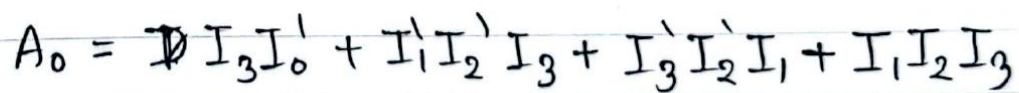
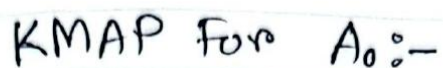
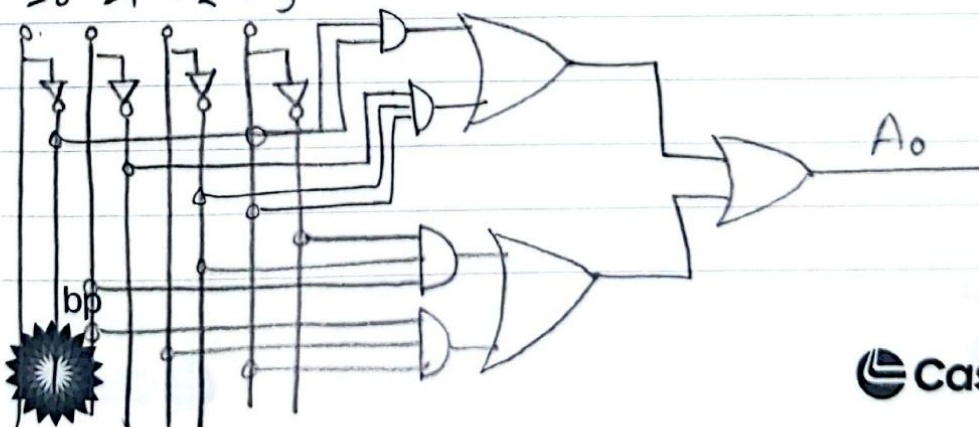
bp

$$A_1 = \Sigma(4, 5, 6, 8, 9, 10, 12, 15) + d(0)$$

$$A_0 = \Sigma(2, 3, 8, 9, 10, 12, 14, 15) + d(0)$$



S	M	T	W	T	F	S
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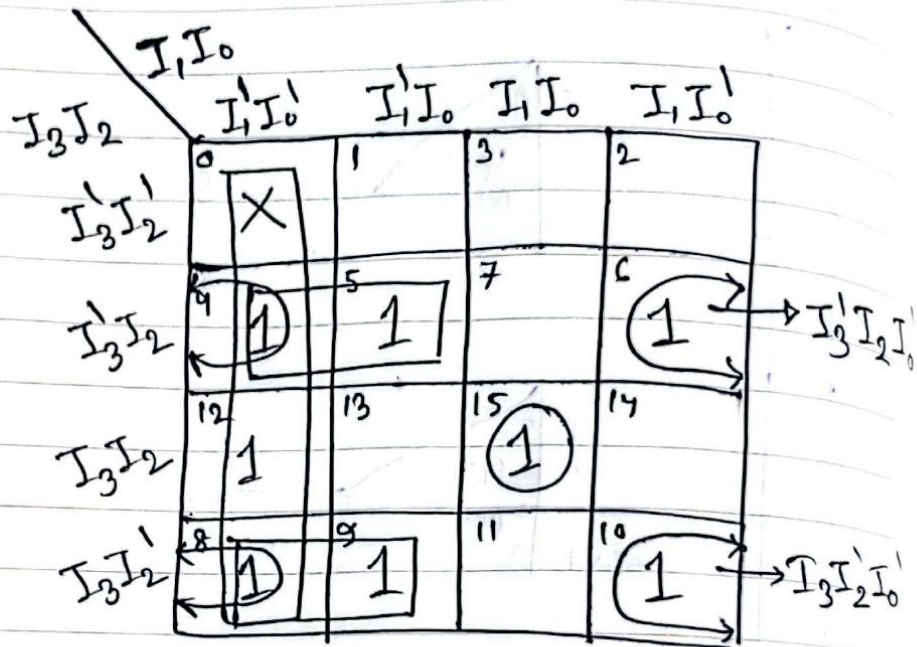

$$I_0 \quad I_1 \quad I_2 \quad I_3$$


Date:

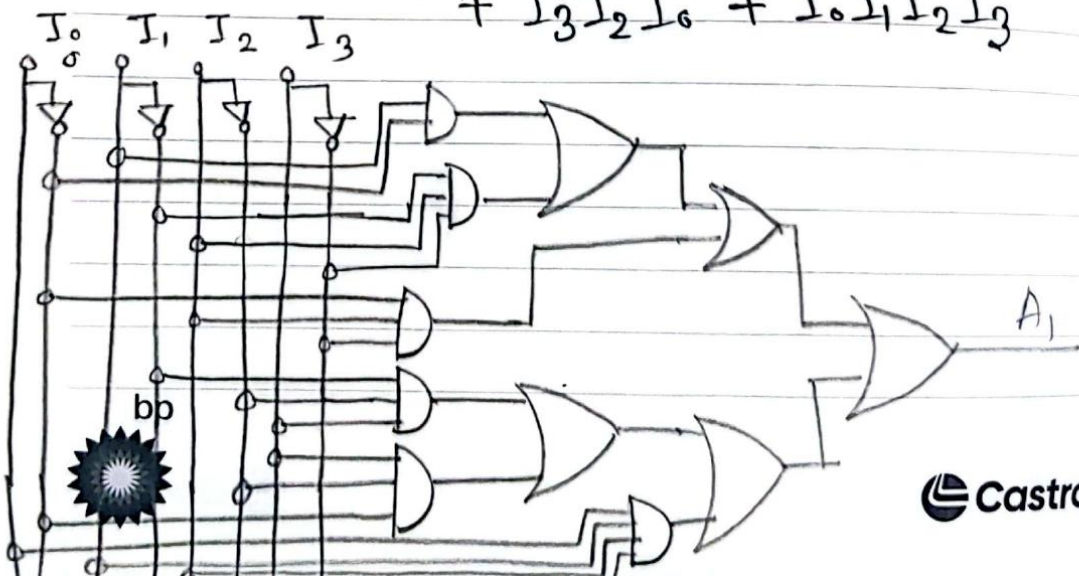
S M T W T F S



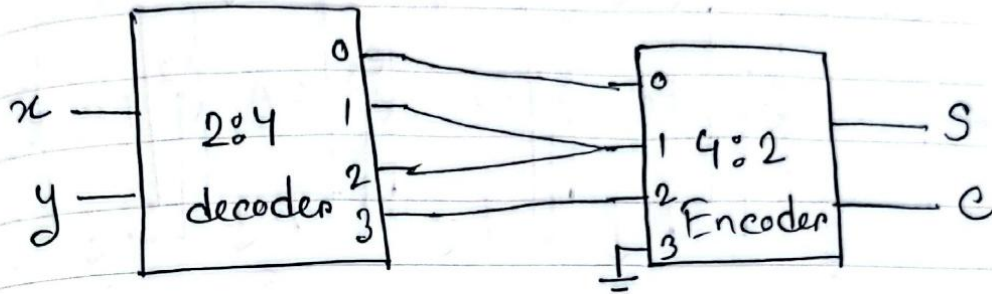
KMAP For A_1 :-



$$A_1 = I_1 I_0 + I_1' I_2 I_3 + I_0' I_2 I_3 + I_1' I_2' I_3 + I_3 I_2' I_0 + I_0 I_1 I_2 I_3$$



9



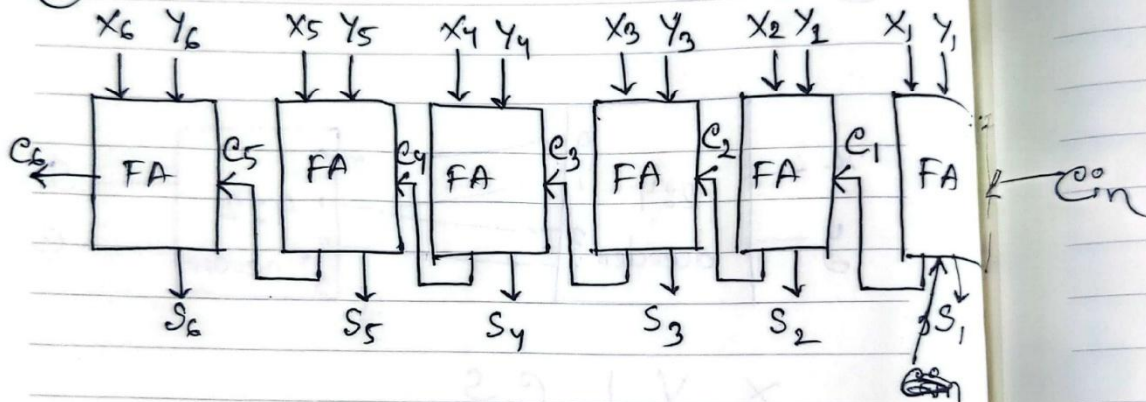
X	Y	C	S	
0	0	0	0	$\rightarrow 0$
0	1	0	1	$\rightarrow 1$
1	0	0	1	$\rightarrow 1$
1	1	1	0	$\rightarrow 2$

Date:

S M T W T F S

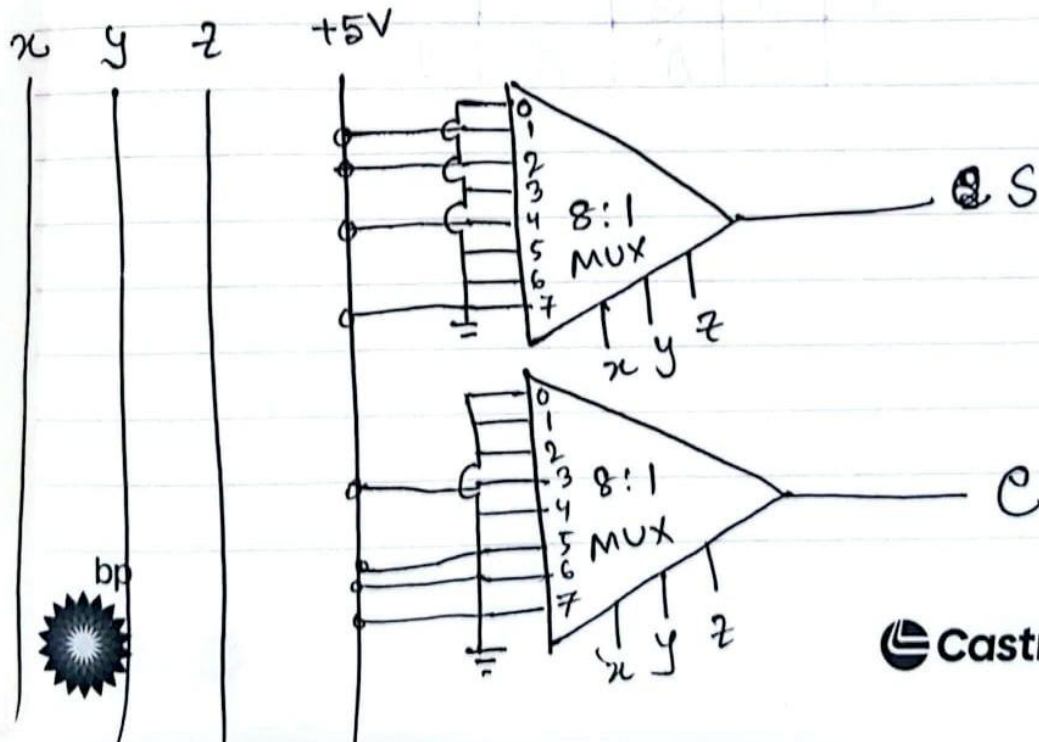


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	x	y	z	c	s
0	0	0	0	0	0
1	0	0	1	0	1✓
2	0	1	0	0	1✓
3	0	1	1	1	0
4	1	0	0	0	1✓
5	1	0	1	1	0
6	1	1	0	1	0
7	1	1	1	1	1✓



Castrol

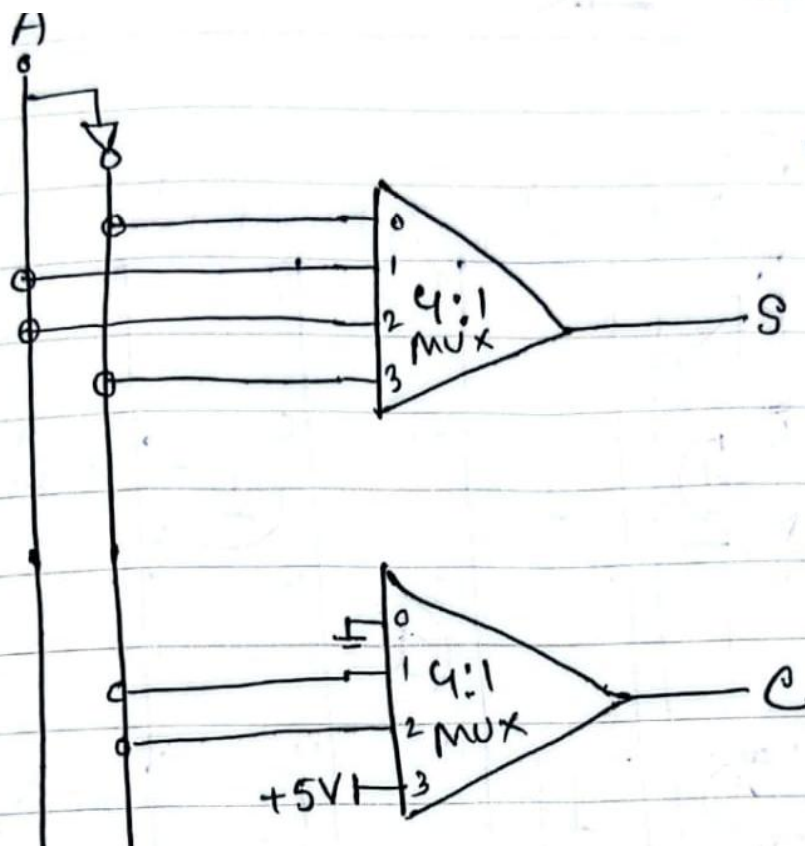
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For Sum,

	I_0	I_1	I_2	I_3
A	0	①	②	3
A'	④	5	6	⑦
	A'	A	A	A'

For Carry,

	I_0	I_1	I_2	I_3
A	0	1	2	③
A'	4	⑤	⑥	⑦
	0	A'	A'	1



Date:

S M T W T F S



(13)

A = 4 bit binary number which is divisible by 4.

$$0 = 0000$$

$$A \text{ can be } \rightarrow 4 = 0100 \checkmark$$

$$8 = 1000 \checkmark$$

$$12 = 1100 \checkmark$$

$$16 = 10000 \times$$

