CAT-II

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Q1)

$F(A,B,C,D) = \pi M(0,3,5,6,8,9,10,12,14)$

converting into SOM form :

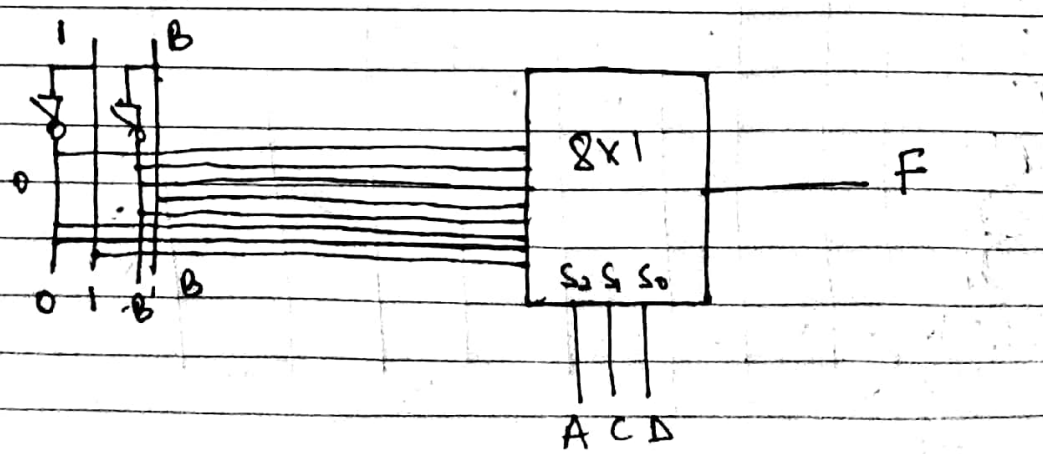
$F(A,B,C,D) = \Sigma m(1,2,4,7,11,15)$

Here A, C, D are select lines. while B is the input.

∴ 8x1 MUX can be used

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

∴ circuit :



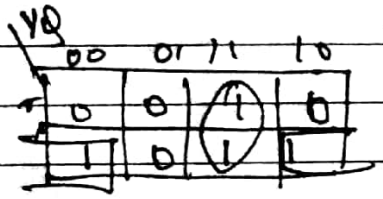
//.

Q2)

a)

X	Y		Q_{t+1}
0	0	0	0
0	1	1	Q_t
1	0	0	Q'_t
1	1	1	1

ch. table:



X	Y	Q_t	Q_{t+1}
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

$\Rightarrow Q_{t+1} = XQ' + YQ$

b)

Q_t	Q_{t+1}	X	Y
0	0	0	X
0	1	1	X
1	0	X	0
1	1	X	1

← Excitation table

Ans.

Q3) $F = \Sigma m(0, 1, 9, 15, 24, 29, 30)$

$d = \Sigma d(8, 11, 31)$

	a	b	c
0 - 00000	0 ✓	0,1 [1] ✓	0, 1, d_8, 9 [1, 8]
1 - 00001	1 ✓	0,8 [8] ✓	
d_8 - 01000	d_8 ✓	1,9 [8] ✓	
9 - 01001	9 ✓	d_8,9 [1] ✓	
d_{11} - 01011	24 ✓	8,24 [16]	
15 - 01111	d_{11} ✓	9,d_{11} [2]	
24 - 11000	15 ✓	15,d_{11} [4]	
29 - 11101	29 ✓	15,d_{31} [16]	
30 - 11110	30 ✓	29,d_{31} [2]	
d_{31} - 11111	d_{31} ✓	30,d_{31} [1]	

	0	1	d_8	9	d_{11}	15	24	29	30	d_{31}
(8,24 [16])			✓				✓			
9, d_{11} [2]				✓	✓					
d_{11}, 15 [4]					✓	✓				
15, d_{31} [16]						✓				✓
(29, d_{31} [2])								✓		✓
(30, d_{31} [2])									✓	✓
(0, 1, d_8, 9 [1,8] ✓)	✓	✓	✓	✓						
	X	X					X	X	X	

↓ prime essential

	A	B	C	D	E
8,14	0	1	0	0	0
	1	1	0	0	0
	-	1	0	0	0

$\Rightarrow BC'D'E'$

	A	B	C	D	E
29, d_{31}	1	1	1	0	1
	1	1	1	1	1
	1	1	1	-	1

$\Rightarrow ABCE$

	A	B	C	D	E
30, d_{31}	1	1	1	1	0
	1	1	1	1	1
	1	1	1	1	-

$\Rightarrow ABCD$

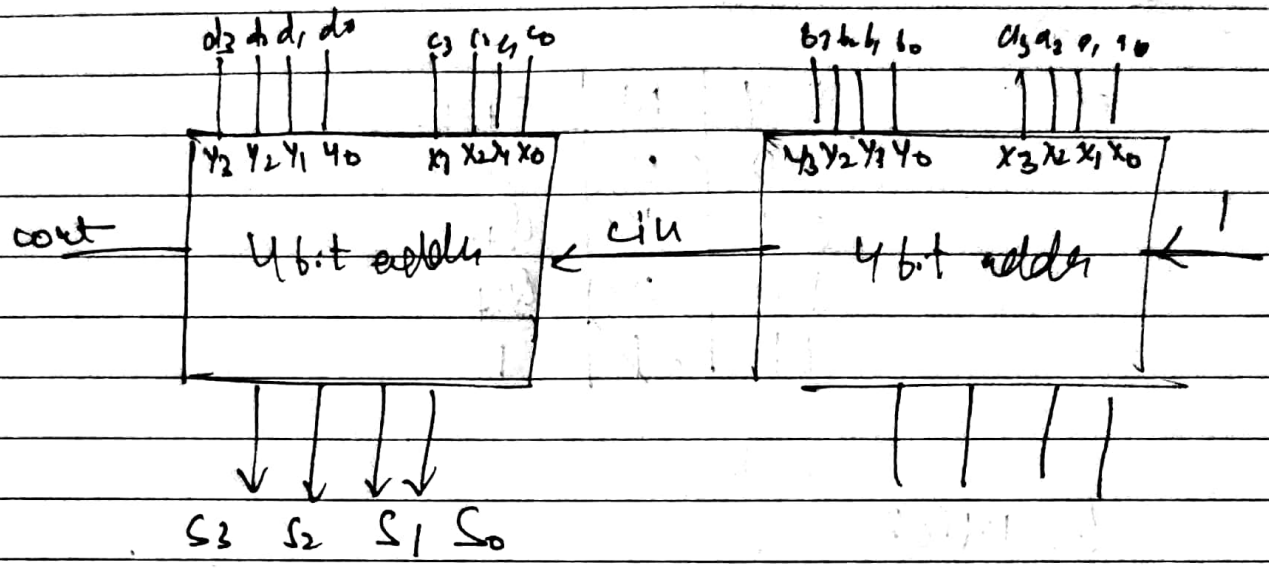
	A	B	C	D	E
0, 1, 8, 9.	0	0	0	0	0
	0	0	0	0	1
	0	1	0	0	0
	0	1	0	0	1
	0	-	0	0	-

$\Rightarrow A'C'D'$

SOP $\Rightarrow F = BC'D'E' + ABCE + ABCD + A'C'D'$

//

Q4)



Ans.