01. A - 3 → 011

	A_3	A_2	A_1	Y_2	Y_1	Y_0	
0	0	0	0	1	1	1	results are less
1	0	0	1	1	1	1	than 7
2	0	1	0	1	1	1	
3	0	1	1	0	0	0	
4	1	0	0	0	0	1	
5	1	0	1	0	1	0	
6	1	1	0	0	1	1	
7	1	1	1	1	0	0	
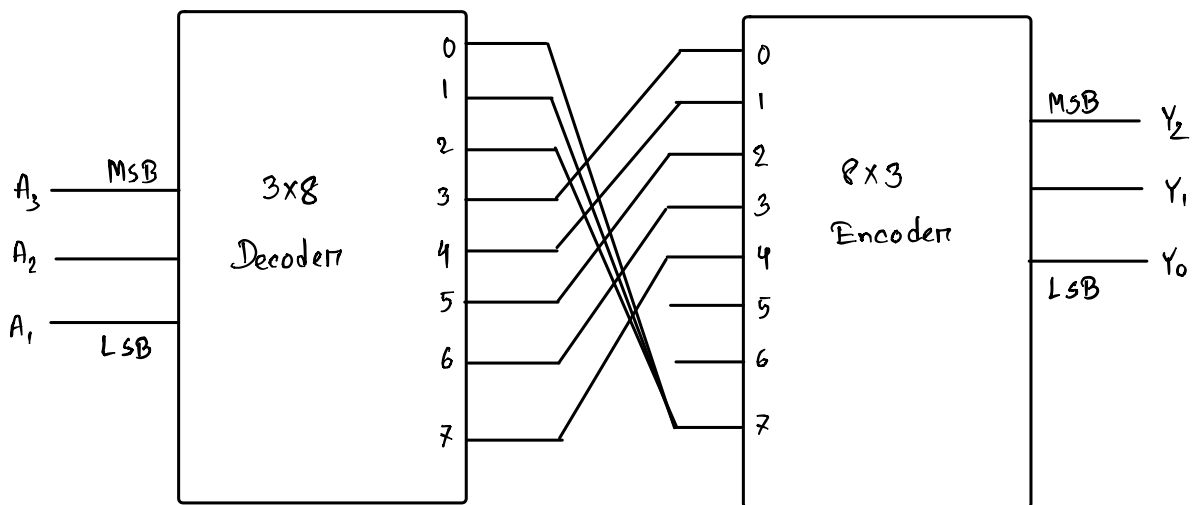
02. $F(A, B, \underline{C, D}) = \Sigma (0, 1, 4, 5, 7, 8, 12, 13)$
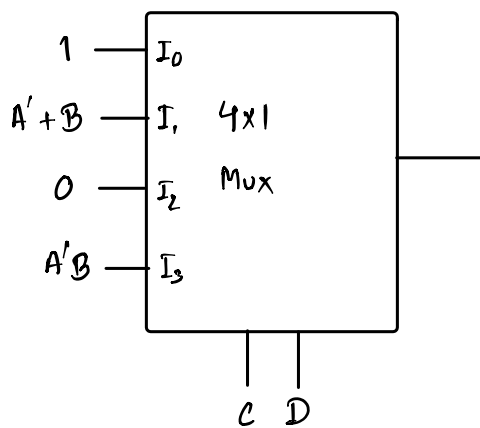
	I_0	I_1	I_2	I_3
$A'B'$	⓪	①	2	3
$A'B$	④	⑤	6	⑦
AB'	⑧	9	10	11
AB	⑫	⑬	14	15
	1		0	$A'B$

$A'B' + A'B + AB$

$= A'(B' + B) + AB$

$= A' + AB$

$= (A' + A)(A' + B)$

$= A' + B$


```
1 ——— I_0
A'+B ——— I_1   4x1
0 ——— I_2   Mux
A'B ——— I_3
         |  |
         C  D
```

03.

4-bit Parallel Adder

C_5 S_4 S_3 S_2 S_1
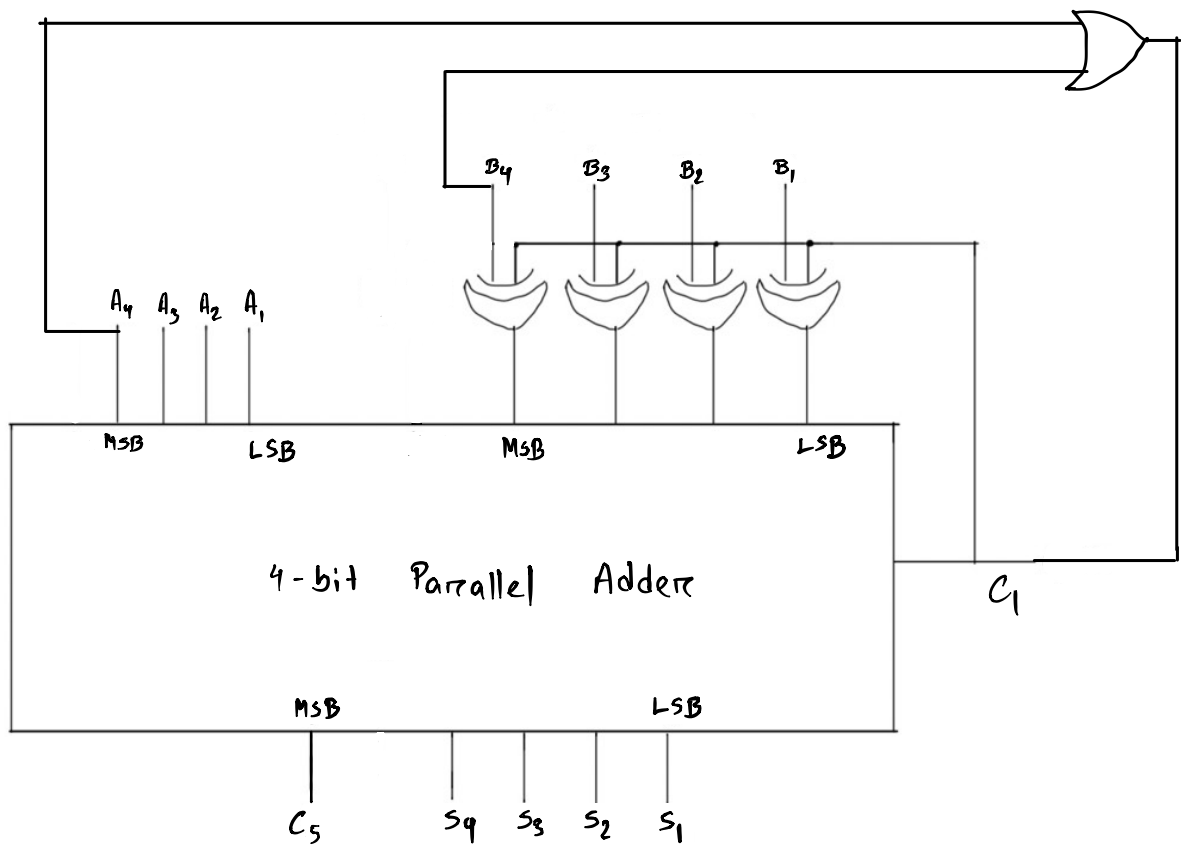
A_4		B_4		C_1	
0	$A \leq 7$	0	$B \leq 7$	0	$A+B$
0	$A \leq 7$	1	$B > 7$	1	$A-B$
1	$A > 7$	0	$B \leq 7$	1	$A-B$
1	$A > 7$	1	$B > 7$	1	$A-B$

$$\therefore \quad C_1 = A_4 + B_4$$

$$= \overline{A_4' \cdot B_4'}$$

$\longrightarrow$ Any one

01. A - ? $\longrightarrow$ 010

	A_3	A_2	A_1	Y_2	Y_1	Y_0	
0	0	0	0	1	1	0	results are less than 6
1	0	0	1	1	1	0	
2	0	1	0	0	0	0	
3	0	1	1	0	0	1	
4	1	0	0	0	1	0	
5	1	0	1	0	1	1	
6	1	1	0	1	0	0	
7	1	1	1	1	0	1	
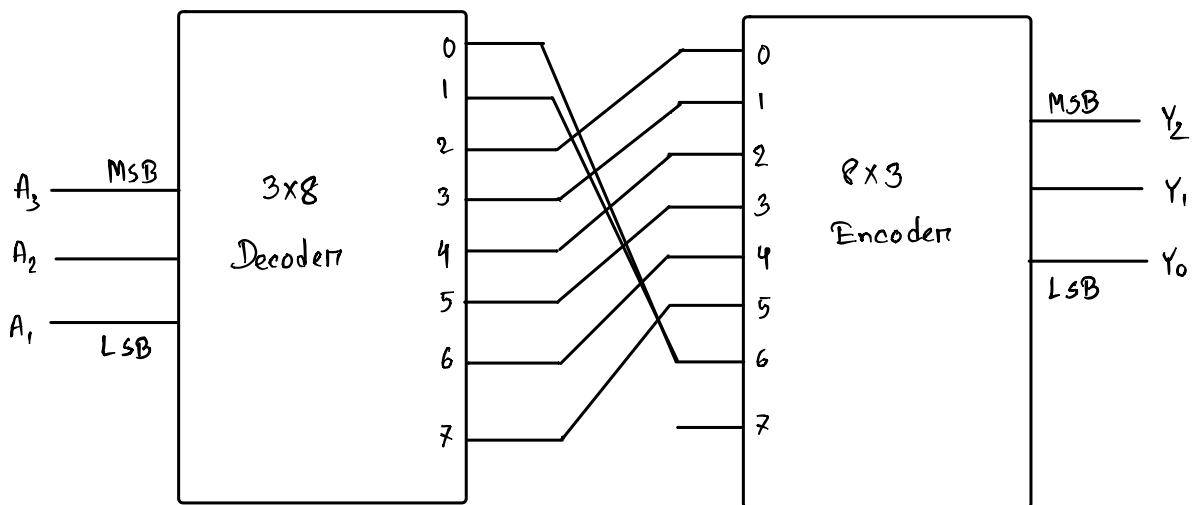
02. $F(A, B, \underline{C, D}) = \Sigma(0, 1, 4, 5, 8, 12, 13, 15)$
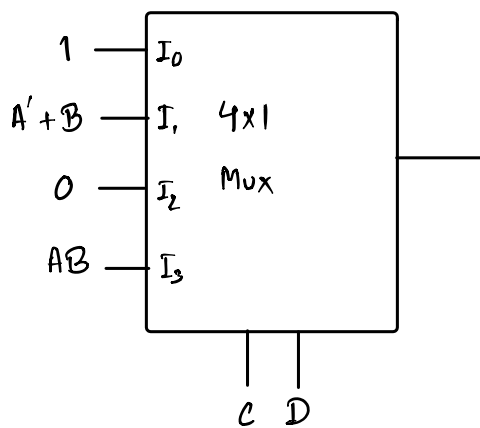
	I_0	I_1	I_2	I_3
$A'B'$	⓪	①	2	3
$A'B$	④	⑤	6	7
AB'	⑧	9	10	11
AB	⑫	⑬	14	⑮
	1		0	AB

$A'B' + A'B + AB$

$= A'(B' + B) + AB$

$= A' + AB$

$= (A' + A)(A' + B)$

$= A' + B$

1 —— I_0

$A' + B$ —— I_1 4x1

0 —— I_2 Mux

AB —— I_3

C D

03.

4-bit Parallel Adder

B_4 B_3 B_2 B_1

A_4 A_3 A_2 A_1

MSB   LSB   MSB   LSB

MSB   LSB

C_5 S_4 S_3 S_2 S_1

C_1
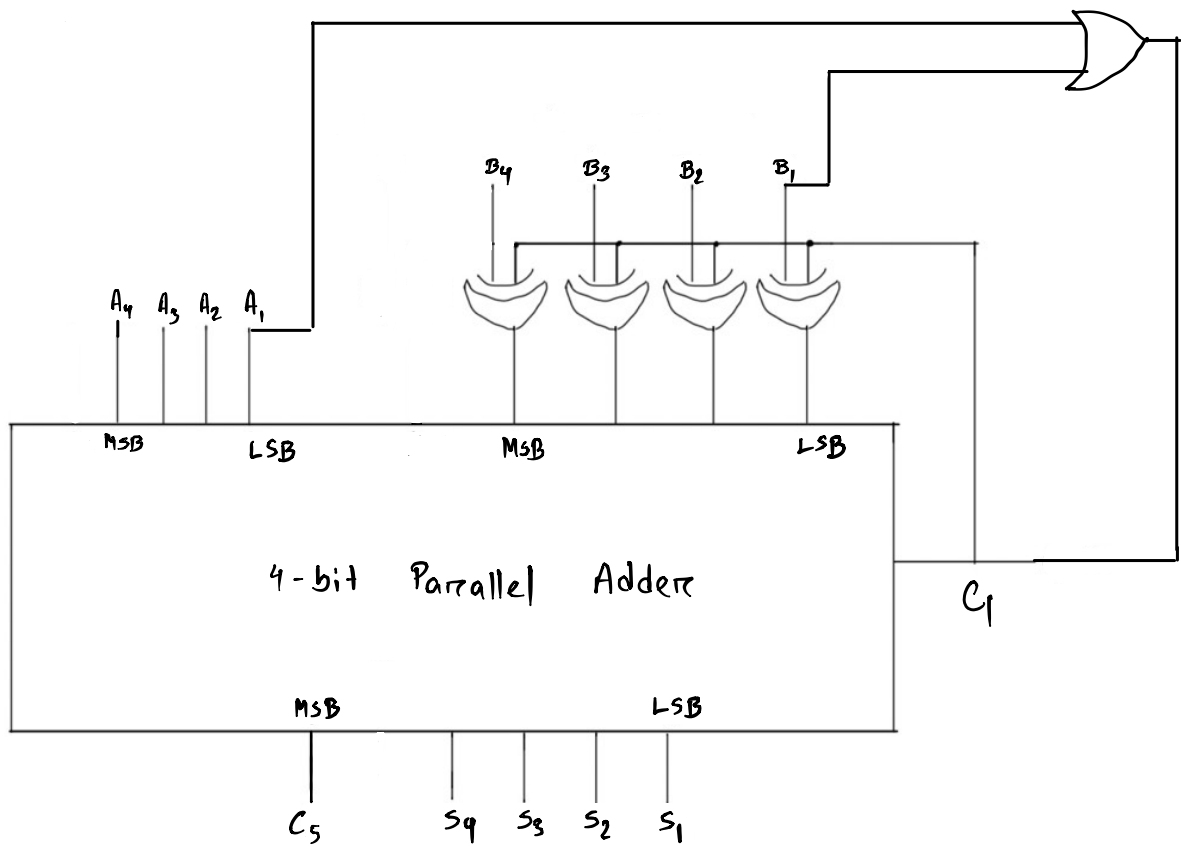
A_1		B_1		C_1	
0	$A \% 2 = 0$	0	$B \% 2 = 0$	0	$A + B$
0	$A \% 2 = 0$	1	$B \% 2 = 1$	1	$A - B$
1	$A \% 2 = 1$	0	$B \% 2 = 0$	1	$A - B$
1	$A \% 2 = 1$	1	$B \% 2 = 1$	1	$A - B$

Divisible by 2 =
Even = Number $\% 2 = 0$

$\therefore \ C_1 = A_1 + B_1$

$= \overline{A_1' \cdot B_1'}$ \quad $\Big\}$ → Any one