Digital Logic Design

Assignment 5

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Csc-201

Q1:

$A = 1,\ B = 0,\ C_{in} = 1$

Sol

$\Sigma = (A \oplus B) \oplus C$

$\Sigma = (1 \oplus 0) \oplus 1$

$\Sigma = (1) \oplus 1$

$\boxed{\Sigma = 0}$

$C_{out} = AB + (A \oplus B)C_{in}$

$C_{out} = (1)(0) + (1 \oplus 0)1$

$C_{out} = 0 + (1)(1)$

$\boxed{C_{out} = 1}$

Ans

Q2:

$\Sigma = 0,\ C_{out} = 0.$

$A = ?,\ B = ?$

for ~~A~~ Σ and C_{out} both to be zero.

the A and B must be zero.

$\boxed{\begin{matrix} A = 0 \\ B = 0 \end{matrix}}$

$\Sigma = A \oplus B$ | $C_{out} = AB$

Ans $0 = 0 \oplus 0$ | $C_{out} = 0.0$

Q 3:

$A = 1, \quad B = 1, \quad C_{in} = 1$

$\Sigma = (A \oplus B) \oplus C_{in}$

$\Sigma = (1 \oplus 1) \oplus 1$

$\Sigma = (0) \oplus 1$

$\boxed{\Sigma = 1}$

$C_{out} = AB + (A \oplus B) C_{in}$

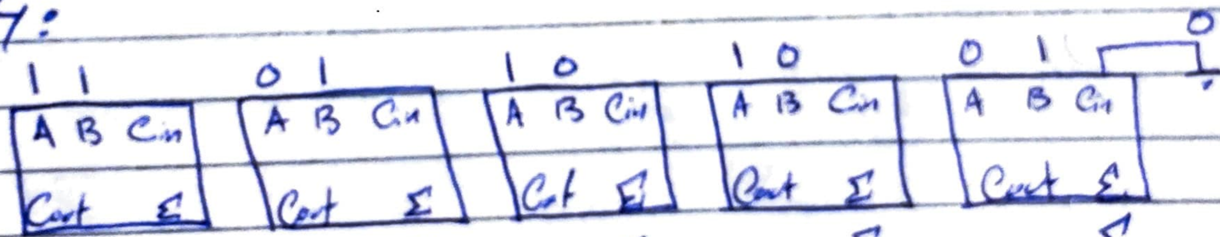
$C_{out} = 1 \cdot 1 + (1 \oplus 1) 1$

$C_{out} = 1 + (0) 1$

$\boxed{C_{out} = 1}$

Ans

Q 4:



E_6	Σ_5	Σ_4	Σ_3	Σ_2	Σ_1
1	0	1	1	1	1

$$
\begin{array}{rr}
 & {}^{1} \\
+\ A = & 10110 \\
B = & 11001 \\
\hline
 & 101111
\end{array}
$$

Answer

Q 5:

(a) When the $\overline{Add}$/Subt is High, the input bits of B will be Complemented, and the resulting Σ will be the Subtraction of the input bits,

(b) When the $\overline{Add}$/Subt is Low, the input bits of B will not be changed and the Circuit will work as a parallel adder for the input bits.

Q 6:

$\overline{Add}/Sobt = 1, \quad A = 1010, \quad B = 1101$

for Σ_0 : $A_0 = 0, \quad B_0 = 1 \oplus 1, \quad C_{in} = 1$

$\Sigma_0 = 0 + 0 + 1 = \boxed{1}, \quad C_{out} = 0$

for Σ_1 : $A_1 = 1, \quad B_1 = 1 \oplus 0, \quad C_{in} = 0$

$\Sigma_1 = 1 + 1 + 0 = \boxed{0}, \quad C_{out} = 1$

for Σ_2 : $A_2 = 0 \quad B_2 = 1 \oplus 1 \quad C_{in} = 1$

$\Sigma_2 = 0 + 0 + 1 = \boxed{1}, \quad C_{out} = 0$

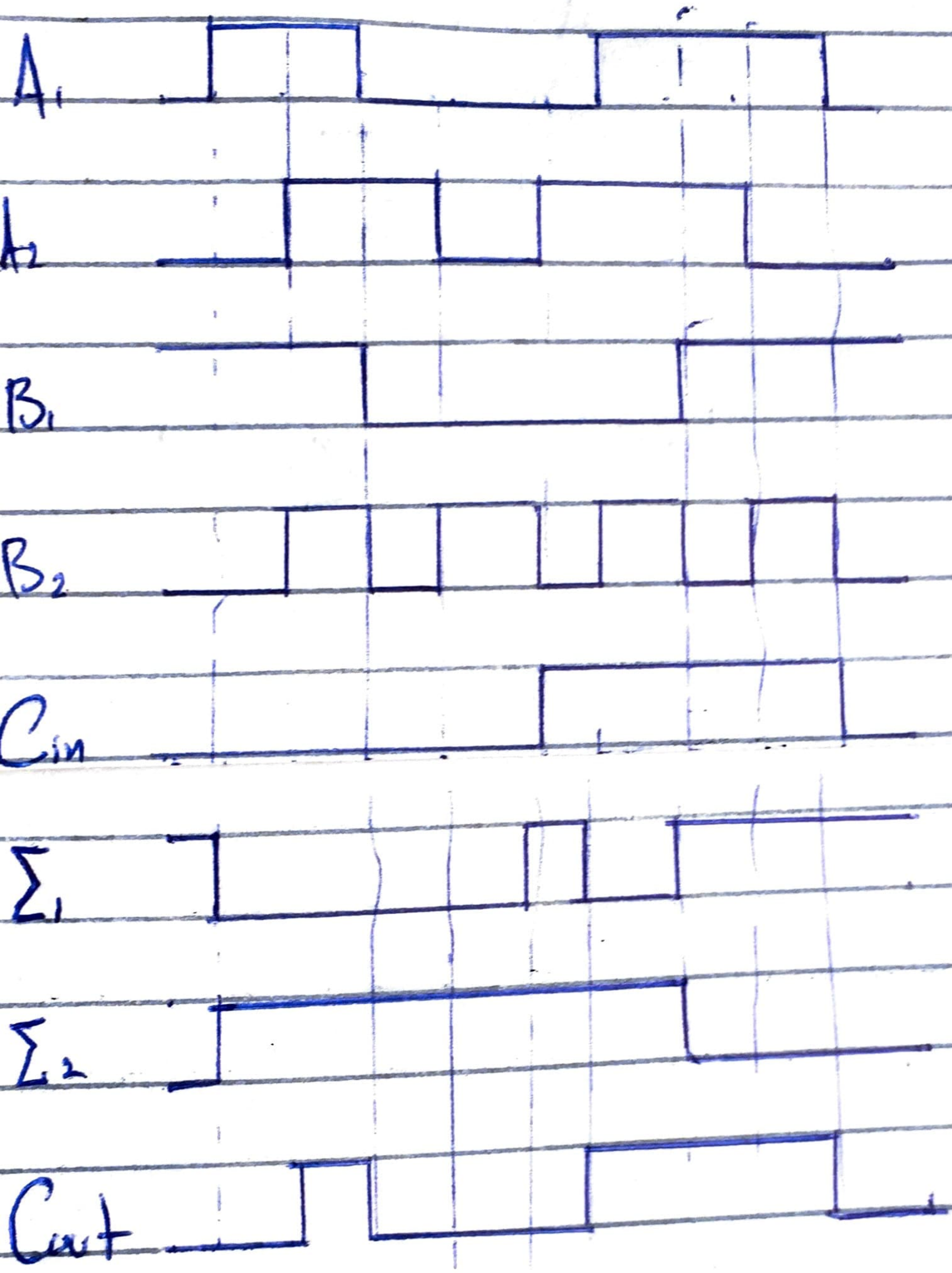
for Σ_3 : $A_3 = 1, \quad B_3 = 1 \oplus 1, \quad C_{out} = 0$

$\Sigma_3 = 1 + 0 + 0 = \boxed{1}, \quad C_{out}\ 0$

$\Sigma = \Sigma_3 \Sigma_2 \Sigma_1 \Sigma_0 = 1101, \quad C_{out} = 0$

Ans

Ans Q 7 a



Q 8:

$A_1 = 1010,\ A_2 = 1100,\ A_3 = 0101,\ A_4 = 1101$

$B_1 = 1001,\ B_2 = 1011,\ B_3 = 0000,\ B_4 = 0001$

Sol

A_4	A_3	A_2	A_1	+	B_4	B_3	B_2	B_1	=	Σ_5	Σ_4	Σ_3	Σ_2	Σ_1
1	0	1	1		0	0	1	1		0	1	1	1	0
1	1	1	0		0	0	0	0		0	1	1	1	0
0	0	0	1		0	0	1	0		0	0	0	1	1
1	1	0	0		1	0	1	1		1	0	1	1	1

$\Sigma_5 = 0001$

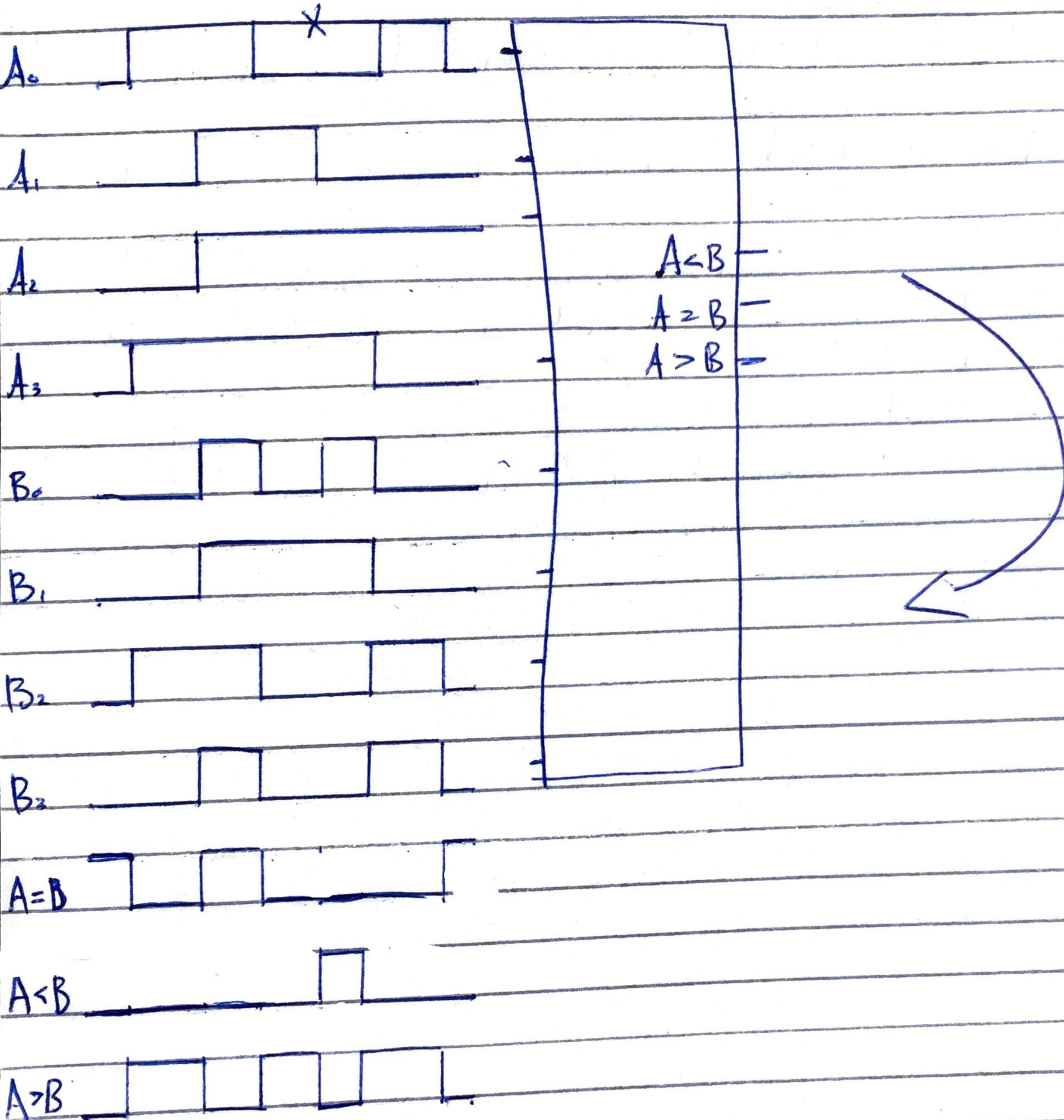
$\Sigma_4 = 1100$

$\Sigma_3 = 1101$

$\Sigma_2 = 1111$

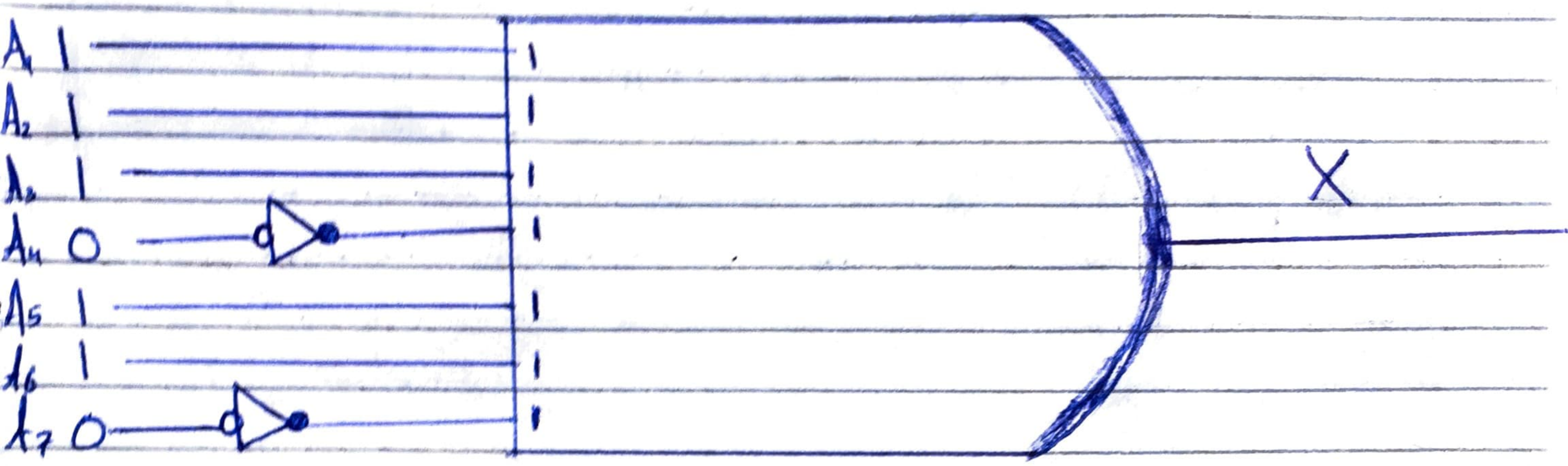
$\Sigma_1 = 0011$ Ans

Q 10:



Q11: 8b

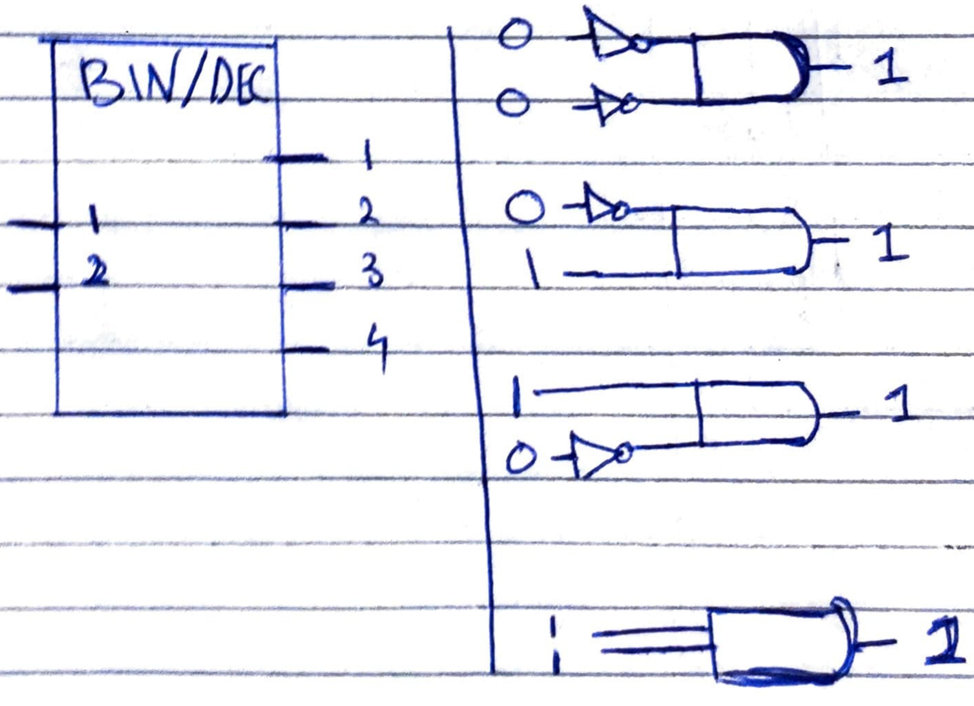
For the output to be High for the given code 1110110, following is the decoding logics that can be used to decode the given code.



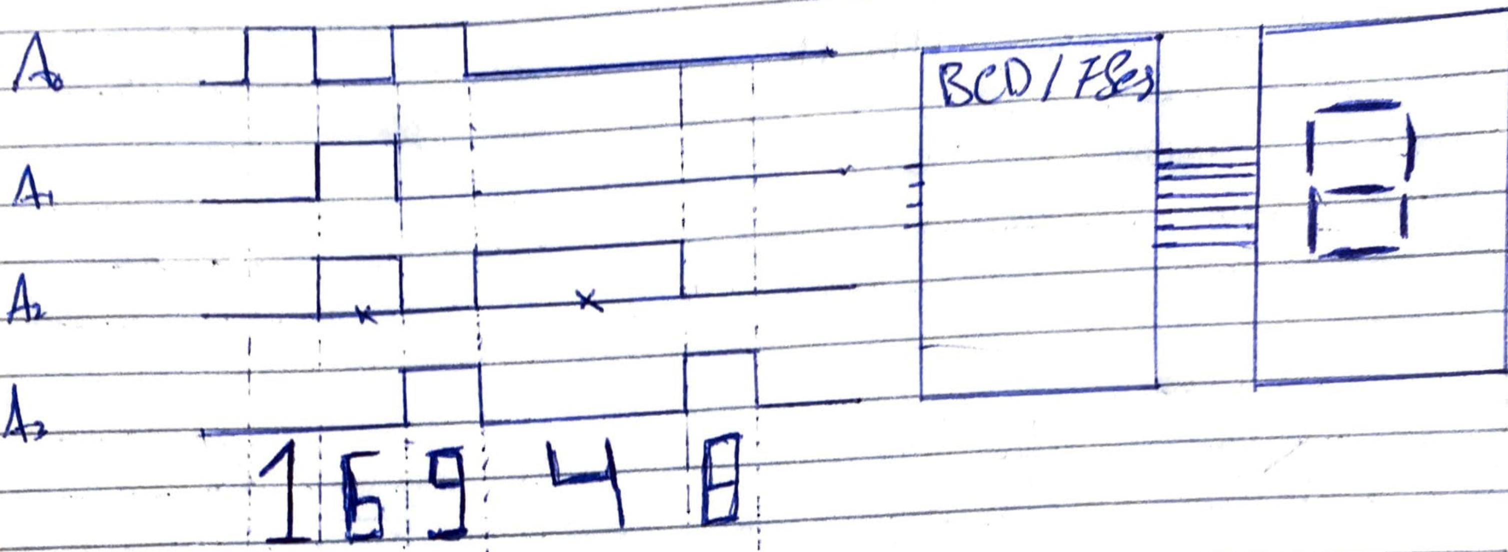
$$X = \overline{A_7} A_6 A_5 \overline{A_4} A_3 A_2 A_1$$

AS

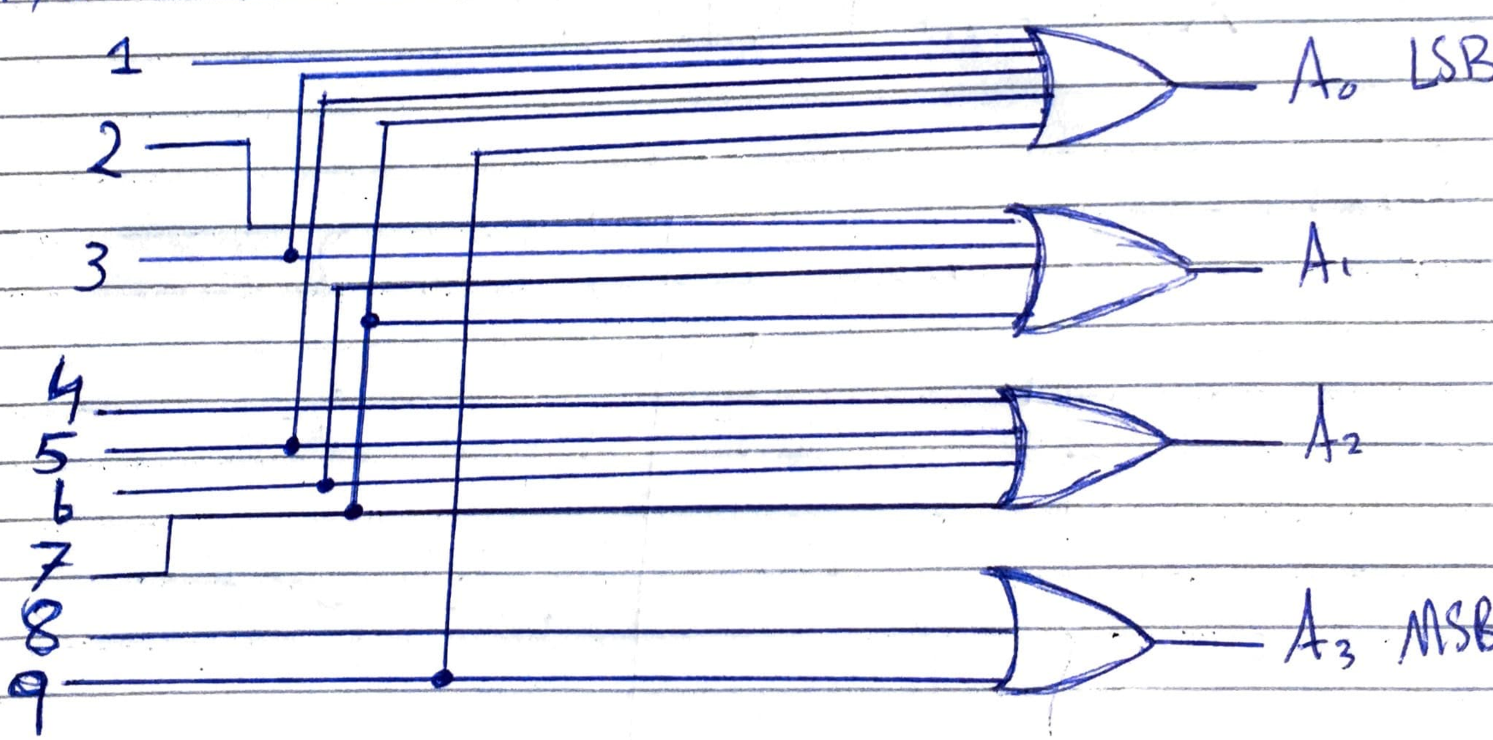
Q12:



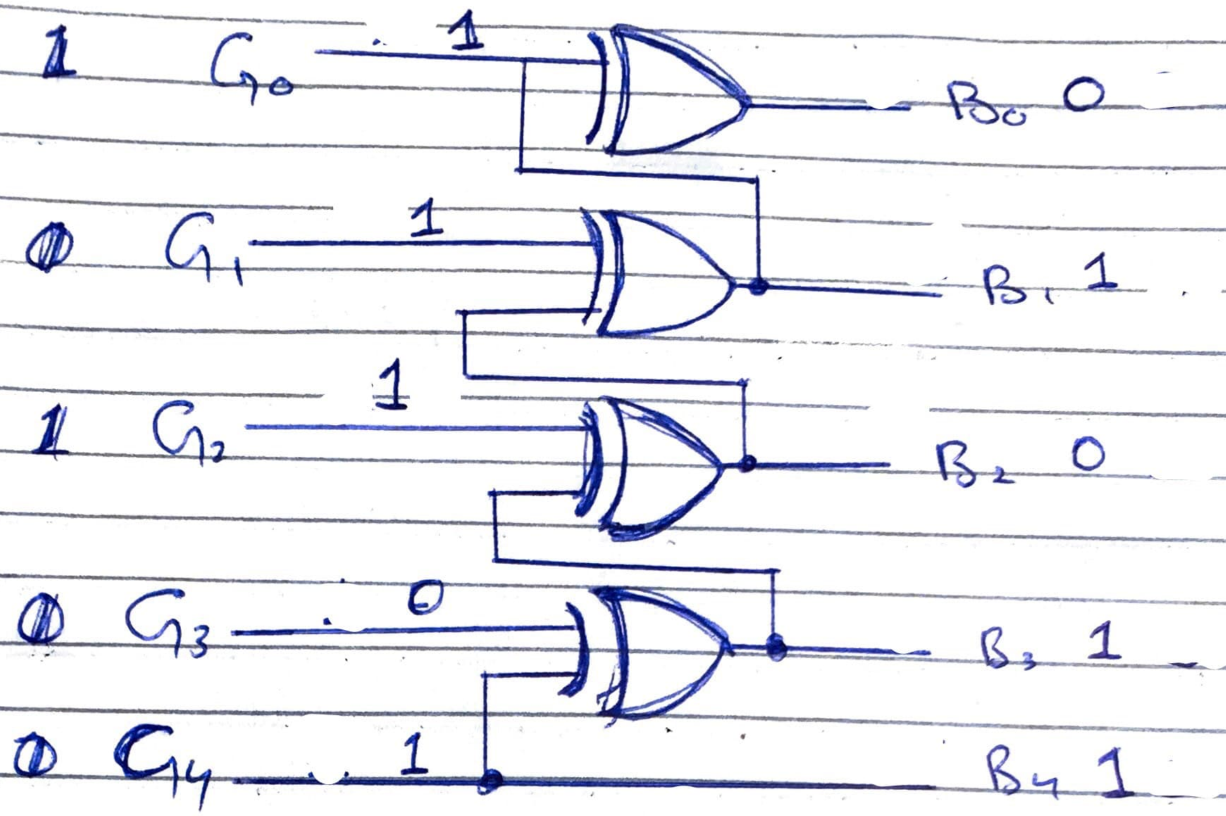
Q13:



Q14:



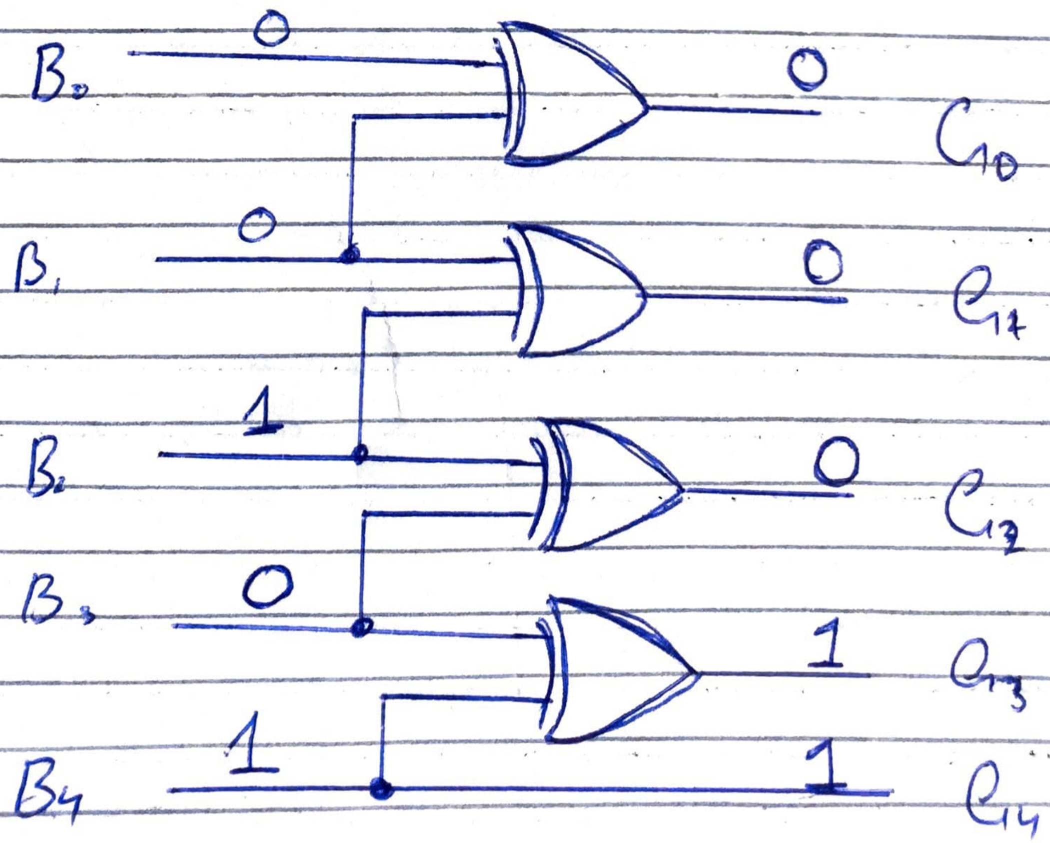
Q16:



$10111_G = 11010_{Bi}$

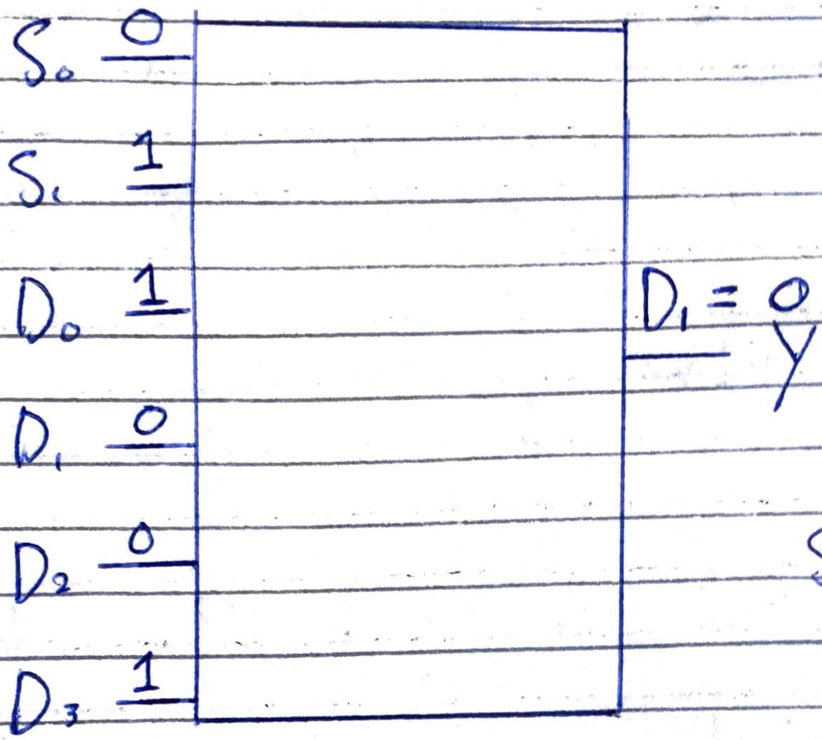
Ans

Q15



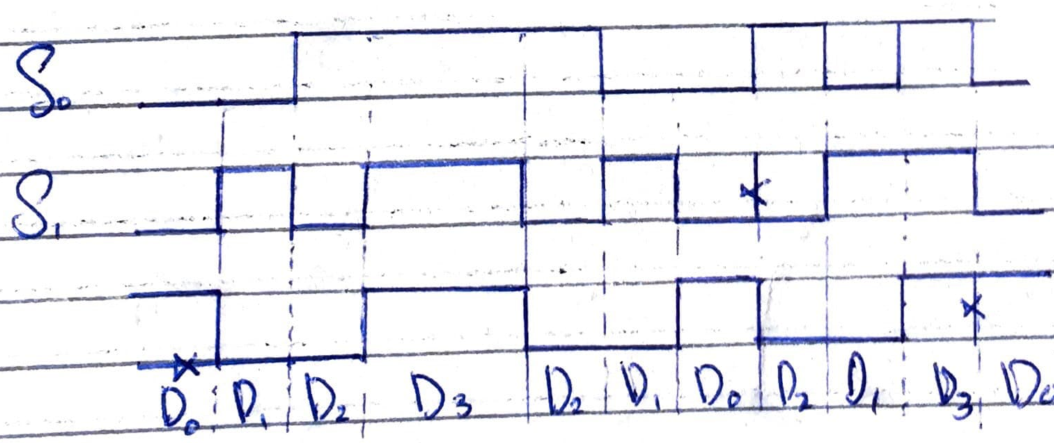
$10100_B = 11000_G$

Q 17:

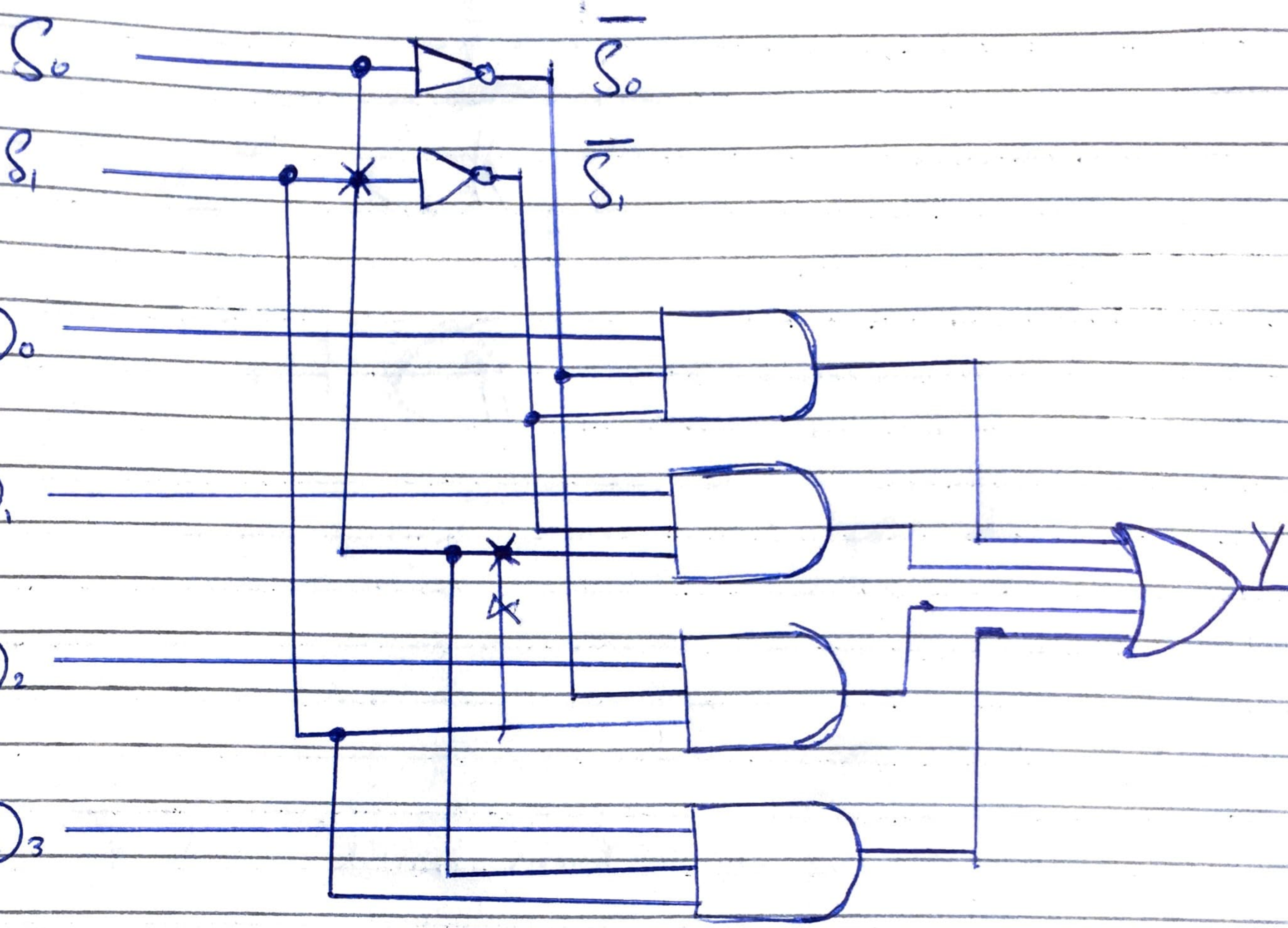


$S_0 . S_1 = 01 \Rightarrow D_1$

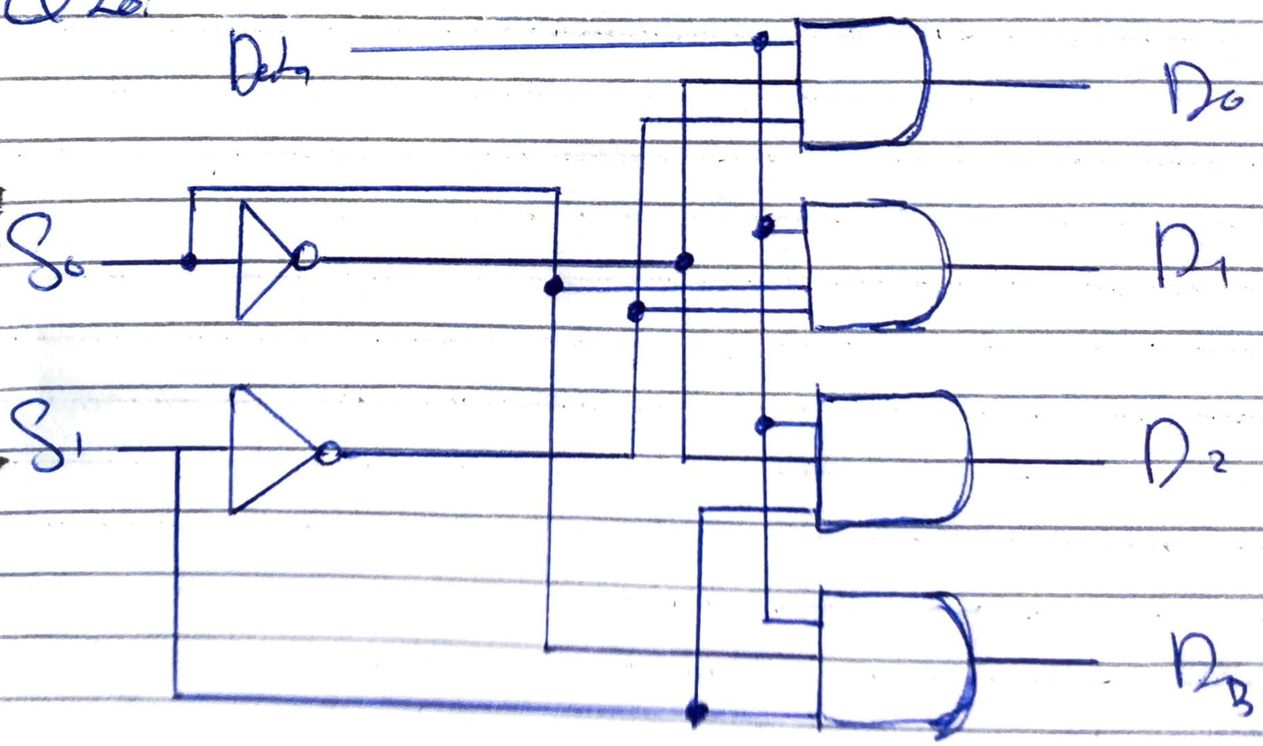
Q 18:



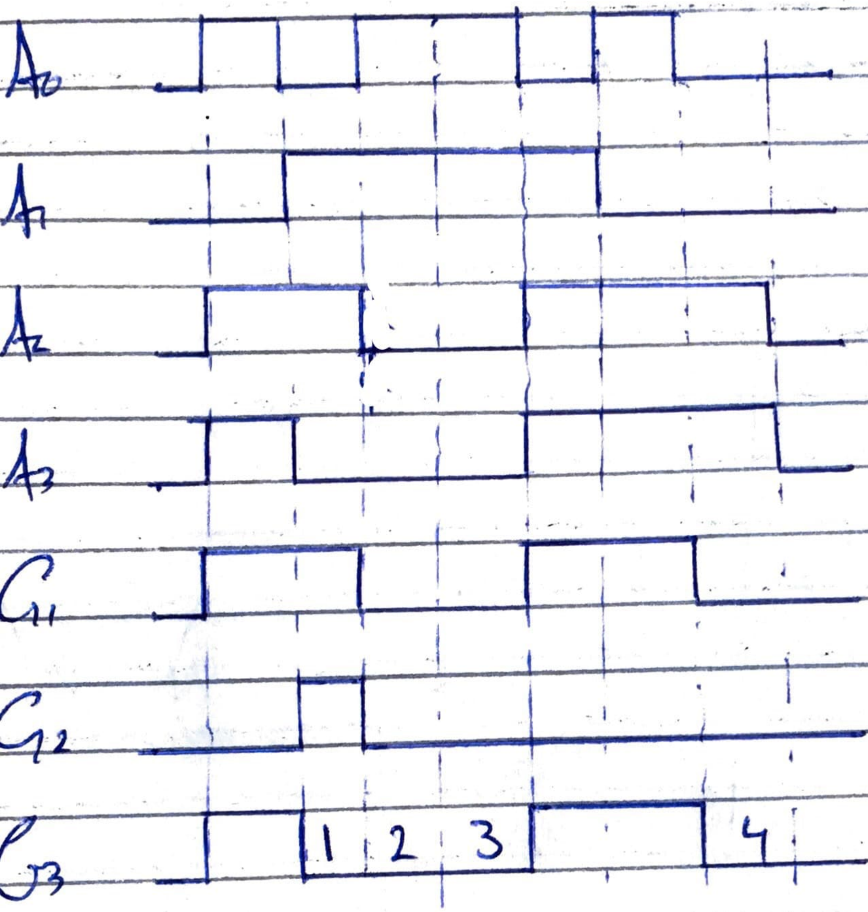
Q19:

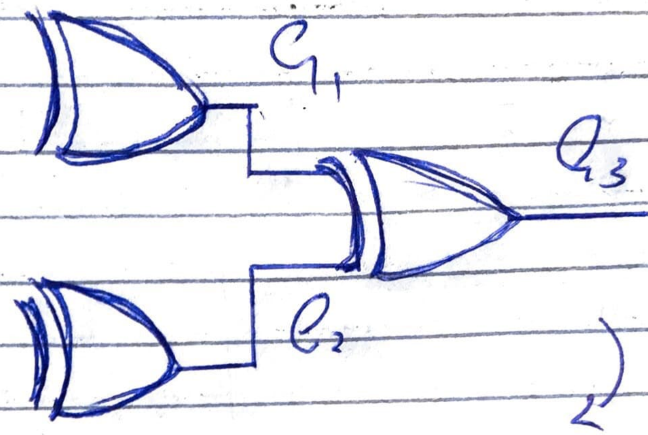


Q20:

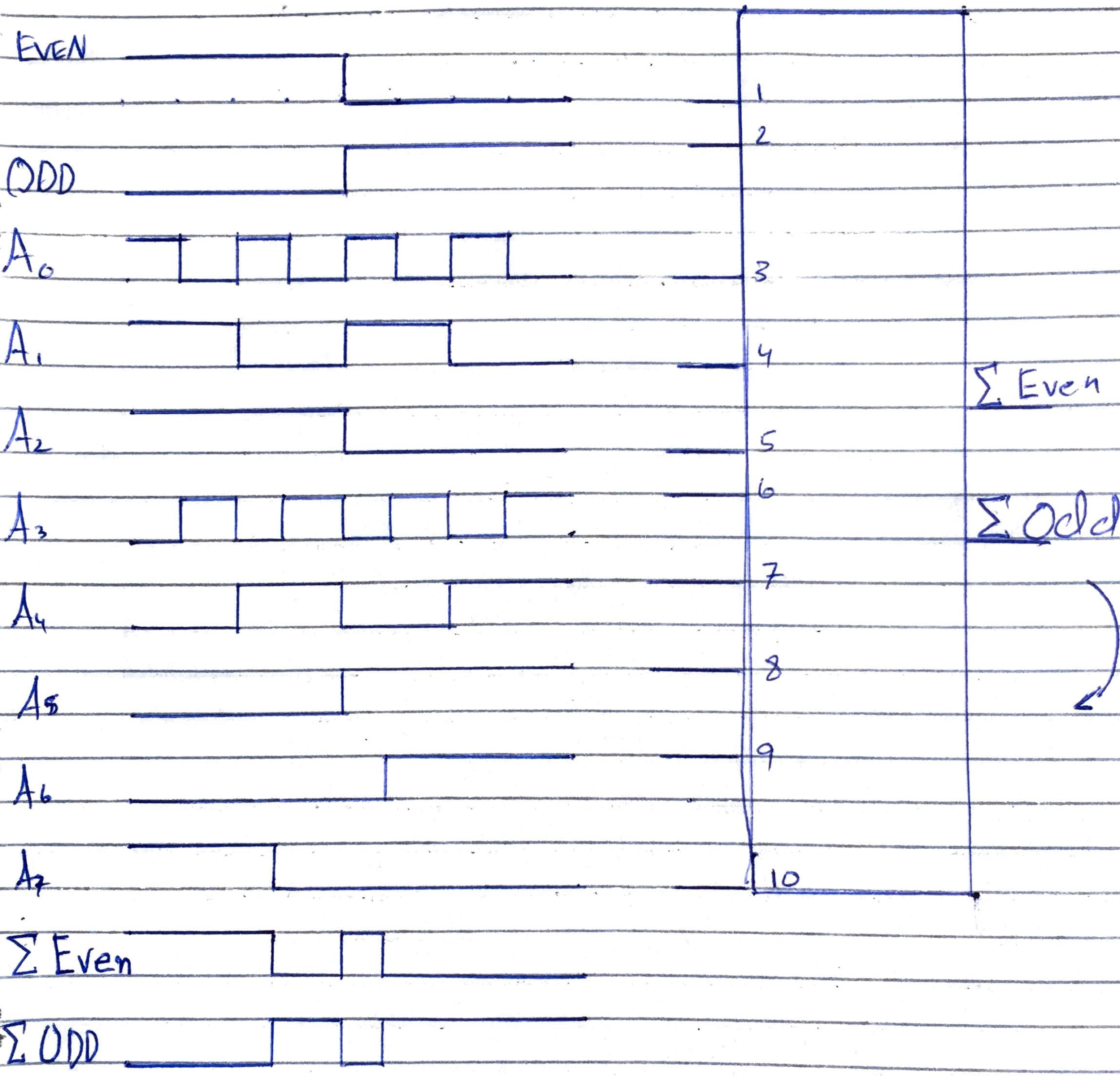


Q21:

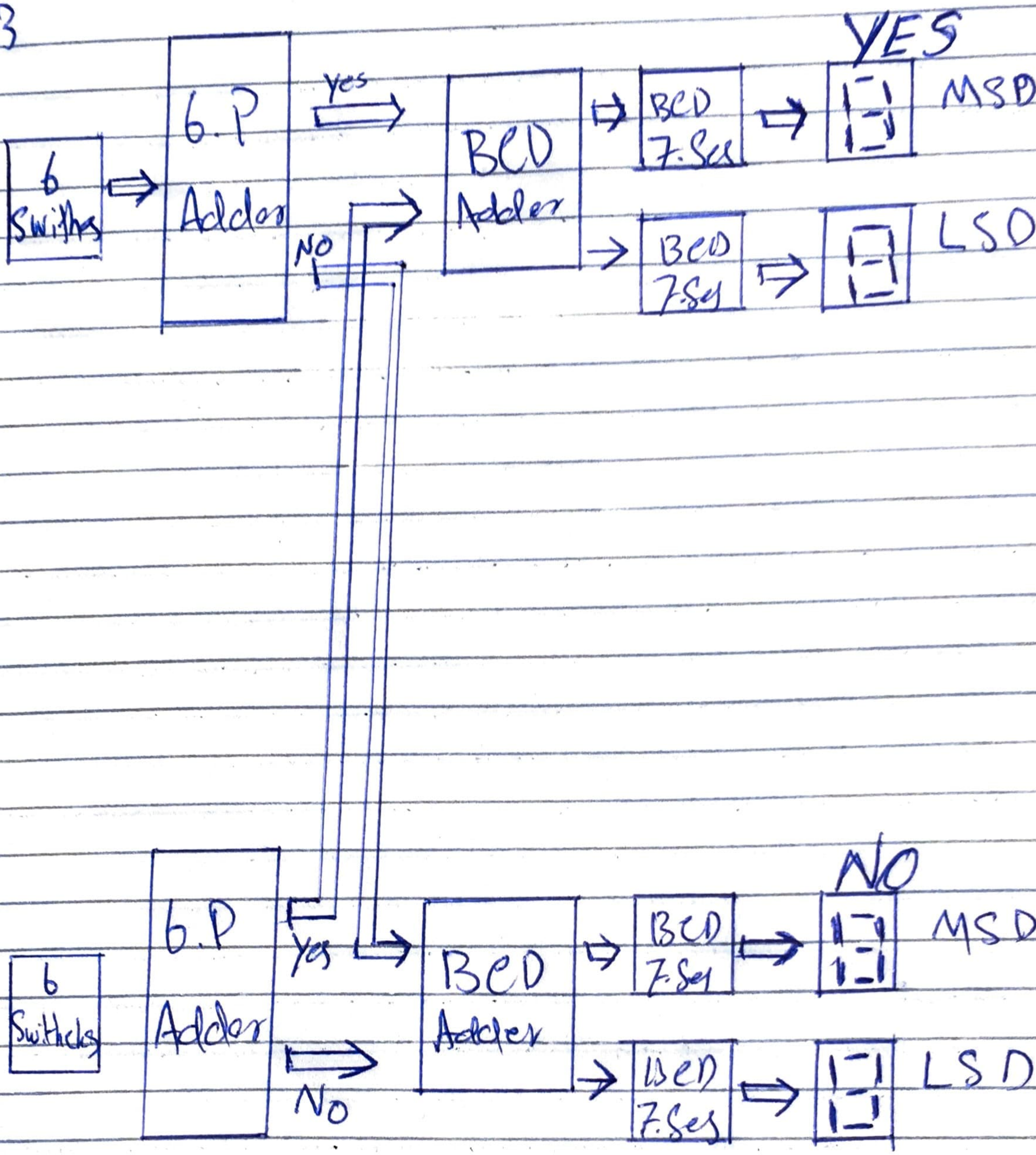




Even parity occures fours times and is Shown by Low.


EVEN
ODD
A0
A1
A2
A3
A4
A5
A6
A7
Σ Even
Σ ODD
1
2
3
4
5
6
7
8
9
10
Σ Even
Σ Odd

Q23


YES
6 Swithes
6.P Adder
yes
No
BCD Adder
BCD 7.Seg
BCD 7.Seg
MSD
LSD
NO
6 Switchs
6.P Adder
Yes
No
BCD Adder
BCD 7.Seg
BCD 7.Seg
MSD
LSD