M. Murad
21K-3064
AI-2B.

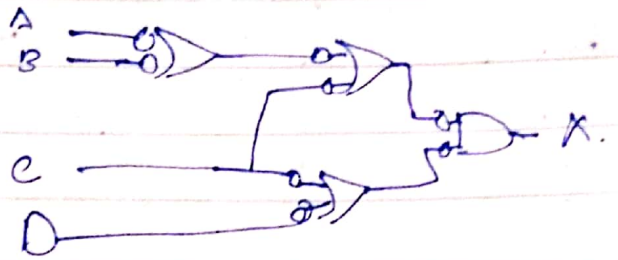
Q No(1)

NAND Active high

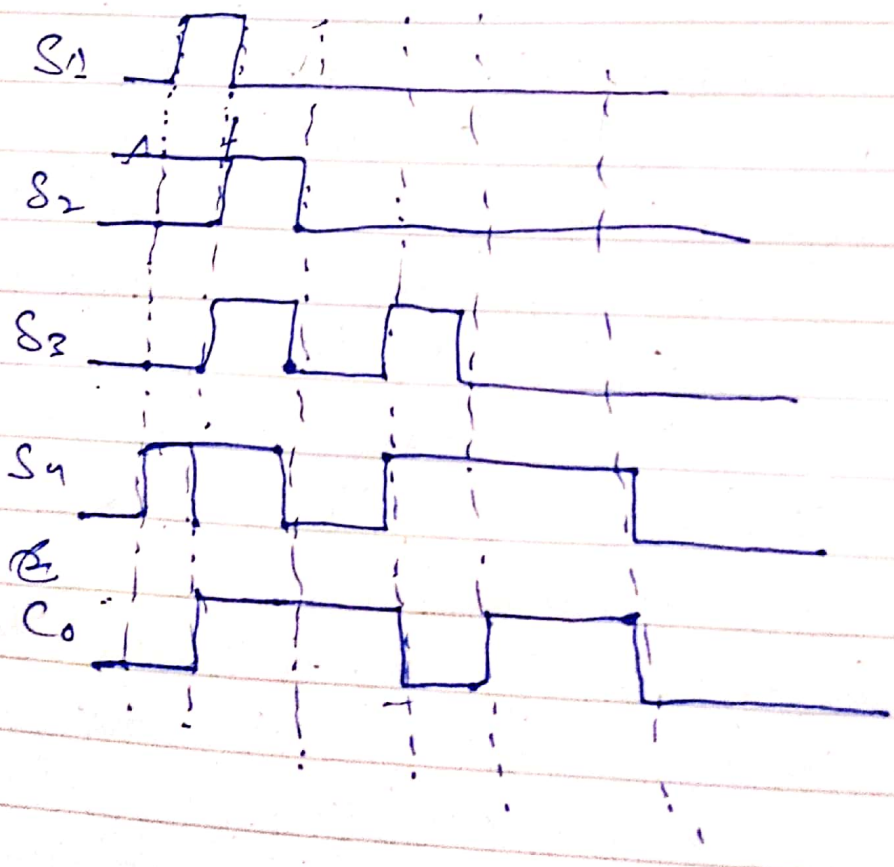
NOR Active high.

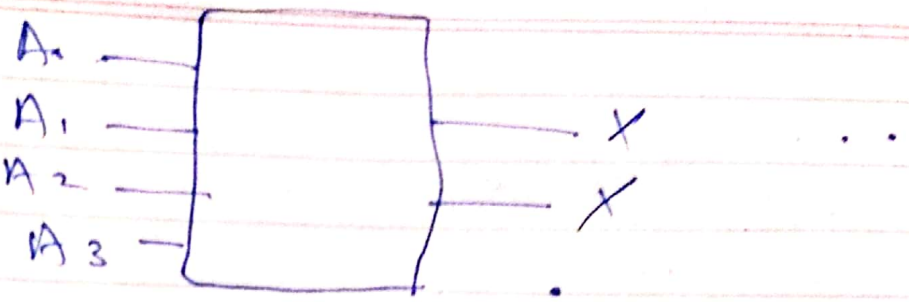
active low.

Active low.



Q No(2)

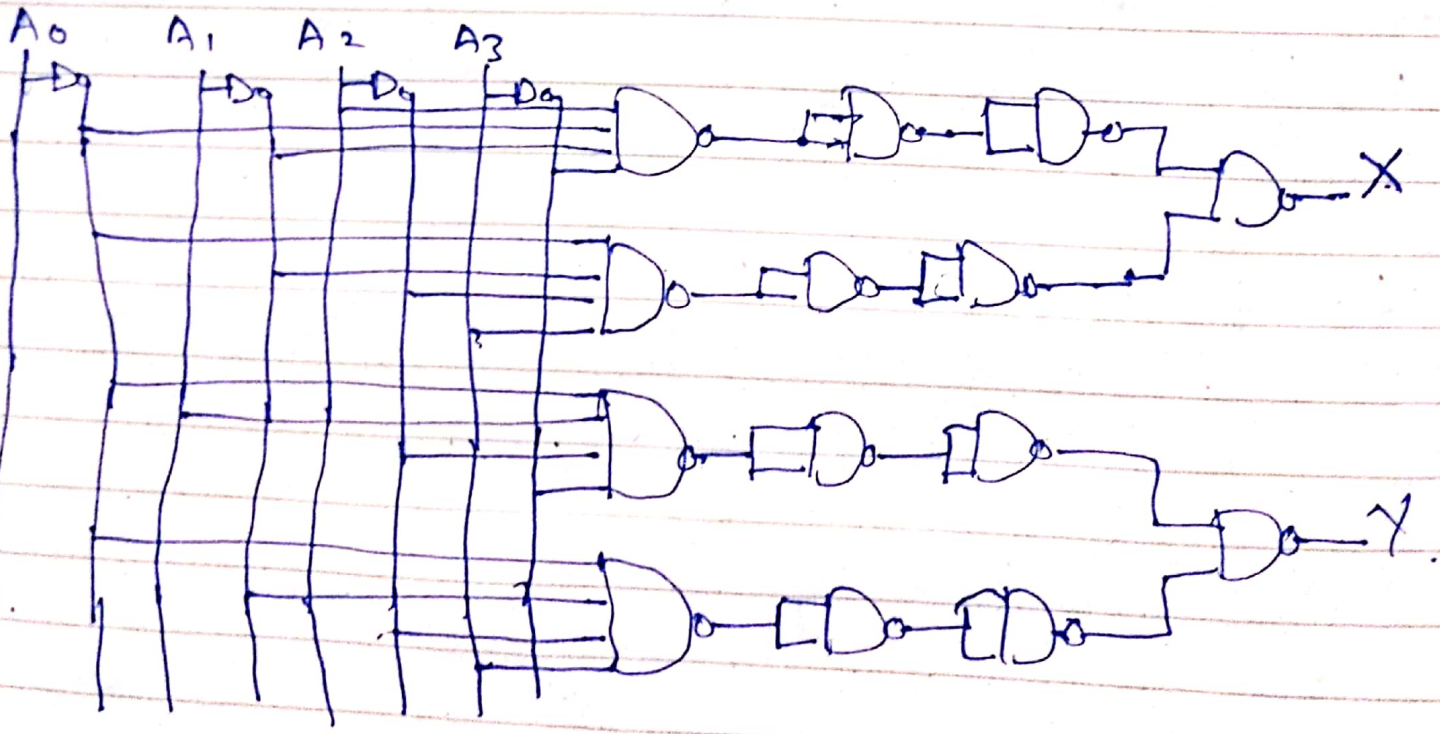




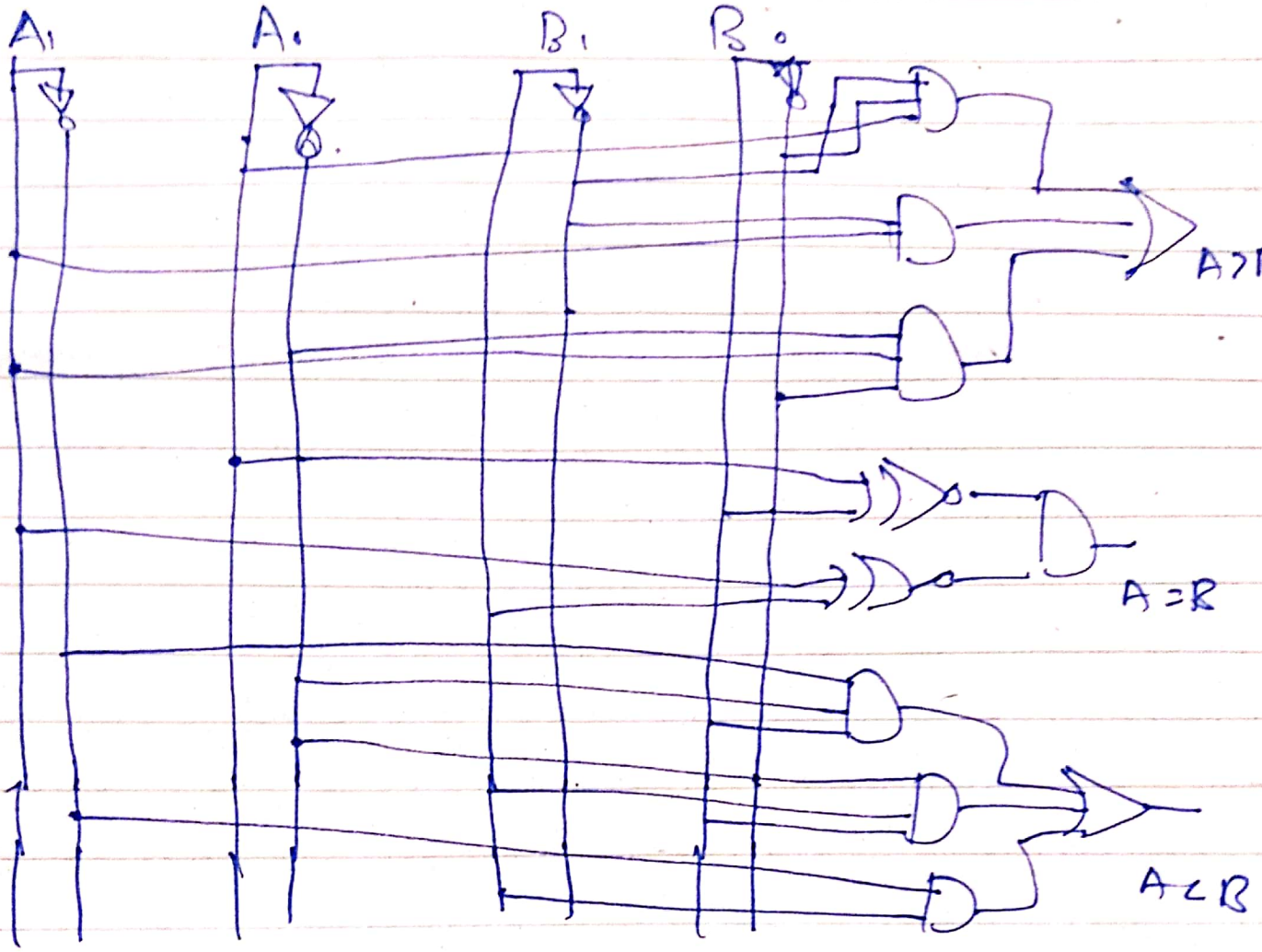
A_0	A_1	A_2	A_3	X	Y
1	0	0	0	0	0
0	1	0	0	0	1
0	0	1	0	1	0
0	0	0	1	1	1

Equation: ✱ $X = \overline{A_0}\,\overline{A_1}\,A_2\overline{A_3} + \overline{A_0}\,\overline{A_1}\,\overline{A_2}\,A_3$

$Y = \overline{A_0}\,A_1\,\overline{A_2}\,\overline{A_3} + \overline{A_0}\,\overline{A_1}\,\overline{A_2}\,A_3$



Qd (4) ⇒.

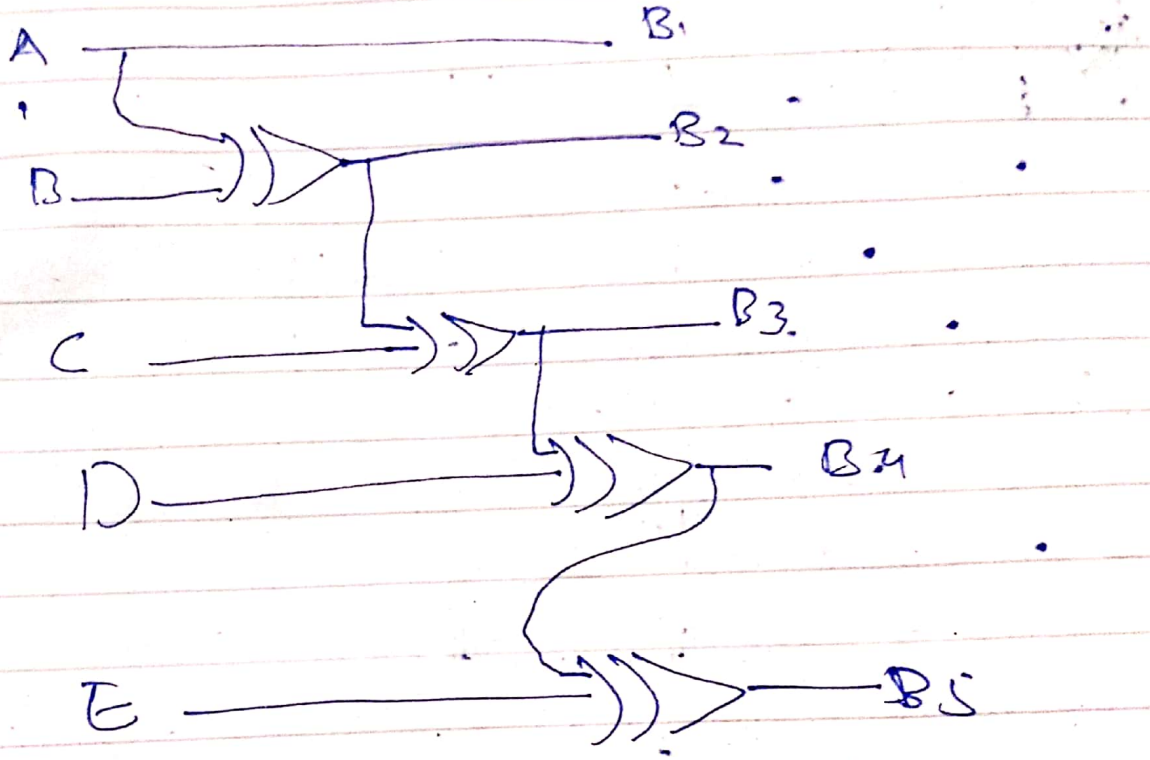


Q No 4 S

binary = 1 0 0 1 1

1 1 1 0 1

A B C D E 5 bit



Q No 6

$$F(A_3, A_2, A_1, A_0) = \Sigma(1, 3, 4, 6, 8, 10, 11, 12, 15)$$

4 → = 3 Selection.

$2^3 = 8$ inputs.

8 × 1 mux

$\Sigma(1, 3, 4, 6, 8, 10, 11, 12, 15)$

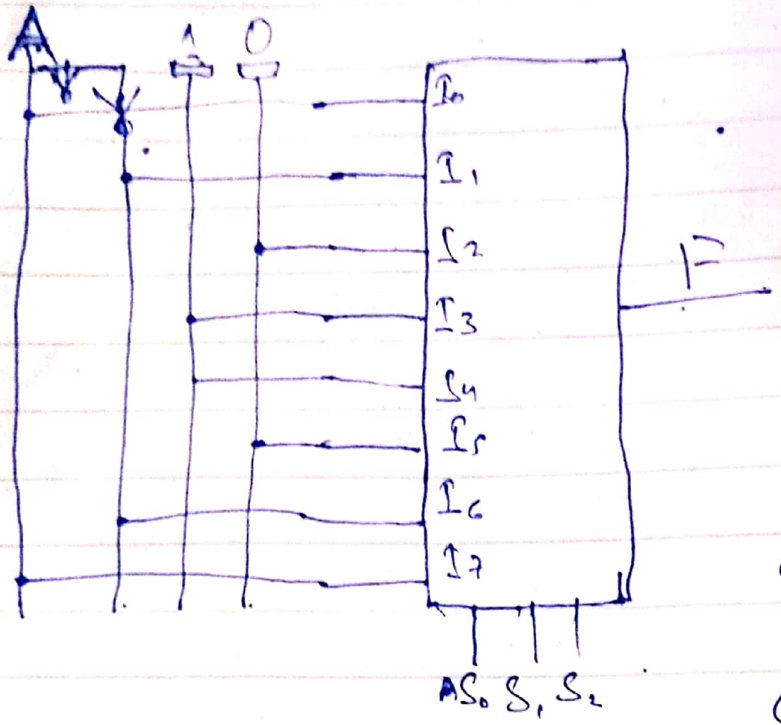
$I_0\ I_1\ I_2\ I_3\ I_4\ I_5\ I_6\ I_7$

A 0 (1) 2 (3) (4) 5 (6) 7

A (8) 9 10 (11) (12) 13 14 (15)

A A' 0 1 1 0 A' A

$I_0\ I_1\ I_2\ I_3\ I_4\ I_5\ I_6\ I_7$.



S_0	S_1	S_2	F
0	0	0	$A_0 I_0$
0	0	1	$A_1 I_1$
0	1	0	I_2
0	1	1	I_3
1	0	0	I_4
1	0	1	I_5
1	1	0	I_6
1	1	1	I_7

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

Q No 7

(a) Full adder using 3–8 decoder.

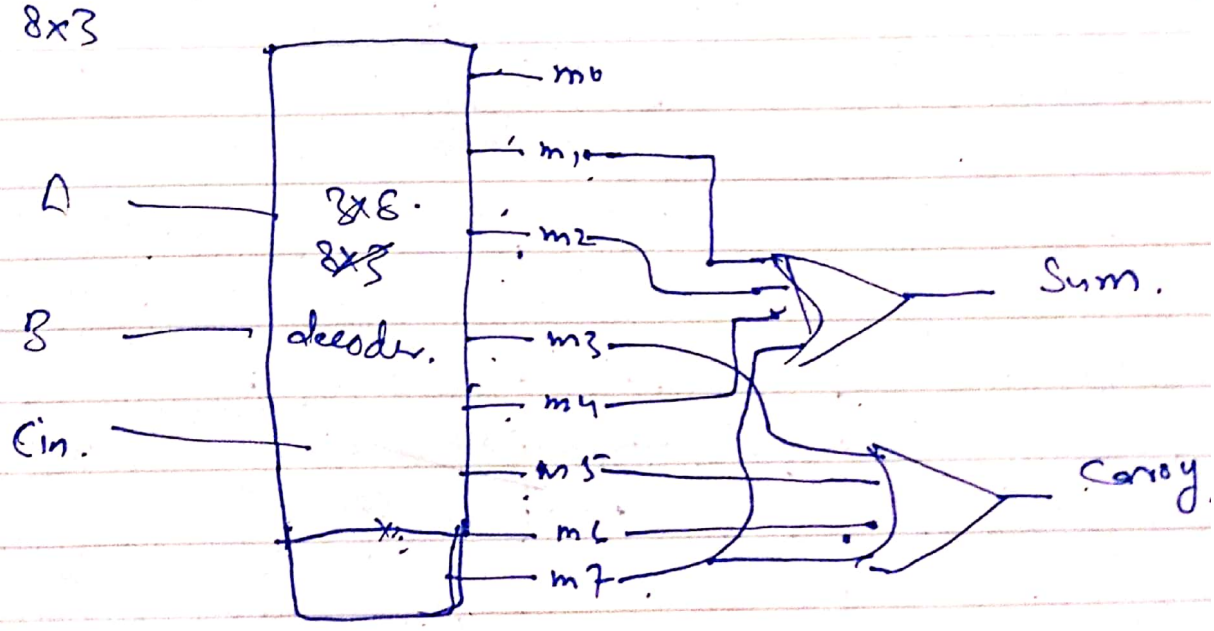
let

A	B	C_{in}	S	C_o	
0	0	0	0	0	m_0
0	0	1	1	0	m_1
0	1	0	1	0	m_2
0	1	1	0	1	m_3
1	0	0	1	0	m_4
1	0	1	0	1	m_5
1	1	0	0	1	m_6
1	1	1	1	1	m_7

for Sum $F_S = \{(m_1, m_2, m_4, m_7)$

Carry $= \{(m_3, m_5, m_6, m_7)$

using



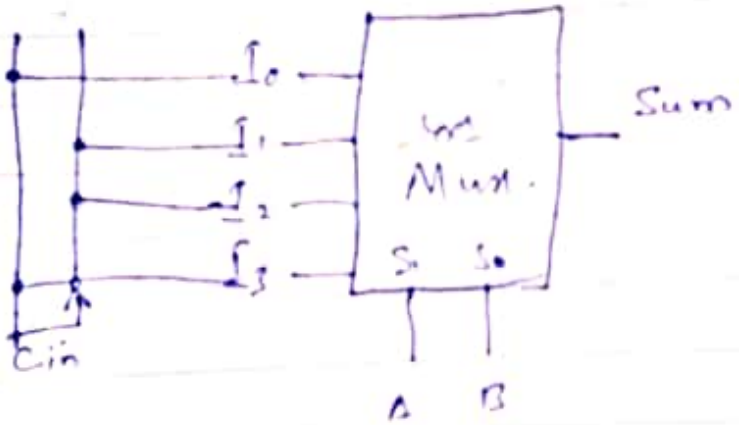
(b) Full adder using 4x1 multiplexer.

For Sum.

S

Cin \ AB	00	01	11	10
0		1		1
1	1		1	

S_1	S_0	I/P
0	0	$I_0 = C_{in}$
0	1	$I_1 = \overline{C_{in}}$
1	0	$I_2 = \overline{C_{in}}$
1	1	$I_3 = C_{in}$

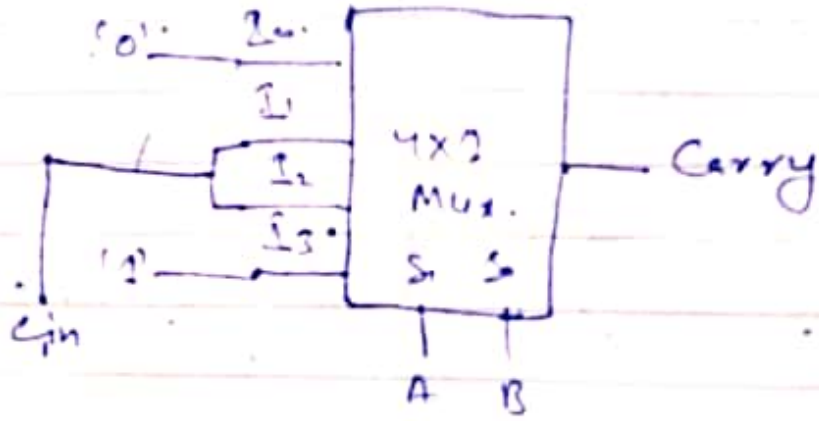


for Carry C

AB

Cin	00	01	11	10
			1	
		1	1	1

S_1	S_0	I/P
0	0	$I_0 = 0$
0	1	$I_1 = C_{in}$
1	0	$I_2 = C_{in}$
1	1	$I_3 = 1$



Q No (8).

less than 9 and greater than 13.

$F(A_3, A_2, A_1, A_0) = \Sigma(0, 1, 2, 3, 4, 5, 6, 7, 8, 14, 15)$

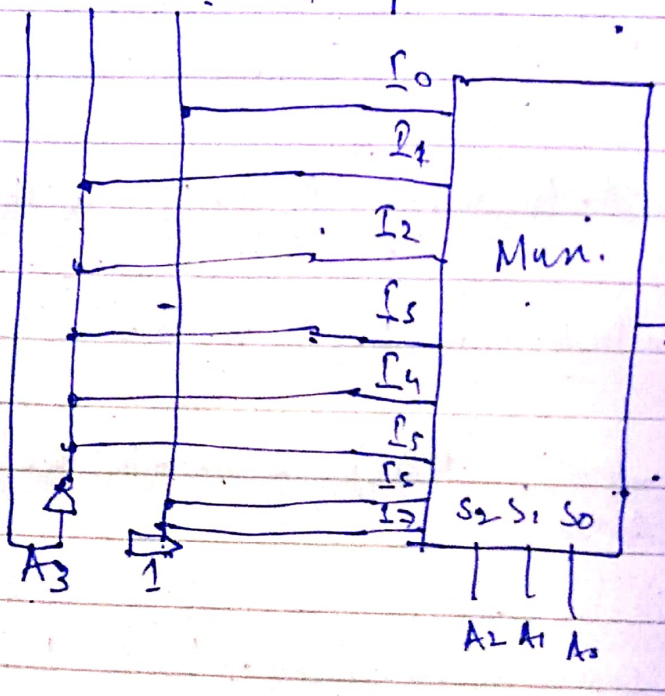
A_3	A_2	A_1	A_0	F
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

use multiplexers

selector = n-1 = 4-1 = 3.

input = $2^3 = 8$.

S_2	S_1	S_0	
0	0	0	I_0
0	0	1	I_1
0	1	0	I_2
0	1	1	I_3
1	0	0	I_4
1	0	1	I_5
1	1	0	I_6
1	1	1	I_7



$\Sigma(0, 1, 2, 3, 4, 5, 6, 7, 8, 14, 15)$

	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
A_0	0	1	2	3	4	5	6	7
A	8	9	10	11	12	13	14	15
	1	$\bar{A}$	$\bar{A}$	$\bar{A}$	$\bar{A}$	$\bar{A}$	1	1

Q No (9) :-

A_3	A_2	A_1	A_0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

$\bar{A_3}\bar{A_2}\bar{A_1}A_0 + A_3\bar{A_2}A_1\bar{A_0} + A_3\bar{A_2}A_1A_0 + A_3A_2\bar{A_1}\bar{A_0}$

A B C D.

$A_3\bar{A_2}(A_1\bar{A_0} + A_1A_0) + \bar{A_1}(\bar{A_3}\bar{A_2}\bar{A_0} + A_3A_2\bar{A_0})$

$A_3\bar{A_2}(A_1(\bar{A_0} + A_0)) + \bar{A_3}\bar{A_2}\bar{A_1}A_0 + A_3\bar{A_2}\bar{A_1}\bar{A_0}$

$= 1$

$A_3\bar{A_2}(A_1)$

$A_3\bar{A_2}A_1 + \bar{A_3}\bar{A_2}\bar{A_1}A_0 + A_3A_2\bar{A_1}\bar{A_0}$