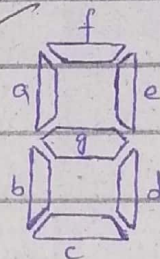


ENCODER DECODER

	A_3	A_2	A_1	A_0	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	0	0	1	1	0	0
2	0	0	1	0	0	1	1	0	1	1	1
3	0	0	1	1	0	0	1	1	1	1	1
4	0	1	0	0	1	0	0	1	1	0	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	1	1	1	0	1	1
7	0	1	1	1	0	0	0	1	1	1	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	0	0	1	1	1	1

Decoder



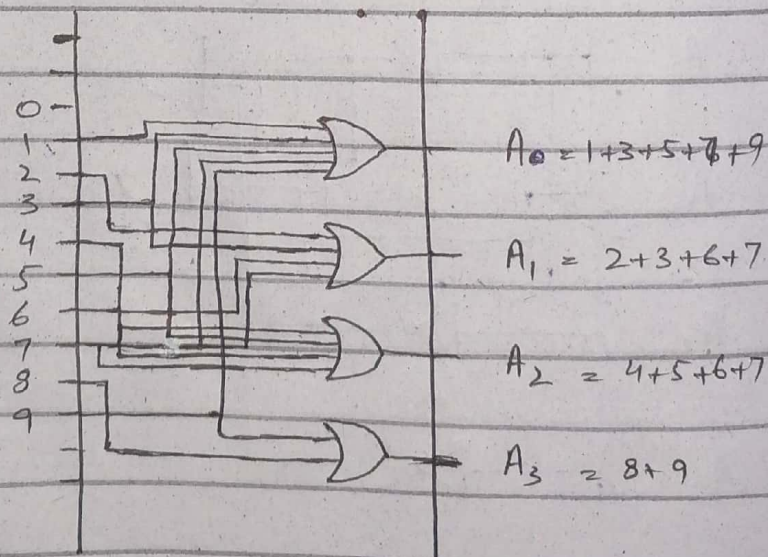
$$A_0 = 1 + 3 + 5 + 7 + 9$$

$$A_1 = 2 + 3 + 6 + 7$$

$$A_2 = 4 + 5 + 6 + 7$$

$$A_3 = 8 + 9$$

Encoder



$$a = \bar{A}_0 \bar{A}_1 \bar{A}_2 \bar{A}_3 + \bar{A}_0 \bar{A}_1 A_2 \bar{A}_3 + A_0 \bar{A}_1 A_2 \bar{A}_3 + \bar{A}_0 A_1 A_2 \bar{A}_3 + \bar{A}_0 \bar{A}_1 \bar{A}_2 A_3 + A_0 \bar{A}_1 \bar{A}_2 A_3$$

$$b = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$c = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$d = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$$e = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$$f = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$$g = \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

K-Map

$$a = \overset{0}{\bar{A}_3} \overset{0}{\bar{A}_2} \overset{0}{\bar{A}_1} \overset{0}{\bar{A}_0} + \overset{0}{\bar{A}_3} \overset{1}{A_2} \overset{0}{\bar{A}_1} \overset{0}{\bar{A}_0} + \overset{0}{\bar{A}_3} \overset{1}{A_2} \overset{0}{\bar{A}_1} \overset{1}{A_0} + \overset{0}{\bar{A}_3} \overset{1}{A_2} \overset{1}{A_1} \overset{0}{\bar{A}_0} +$$

$$\overset{1}{A_3} \overset{0}{\bar{A}_2} \overset{0}{\bar{A}_1} \overset{0}{\bar{A}_0} + \overset{1}{A_3} \overset{0}{\bar{A}_2} \overset{0}{\bar{A}_1} \overset{1}{A_0}$$

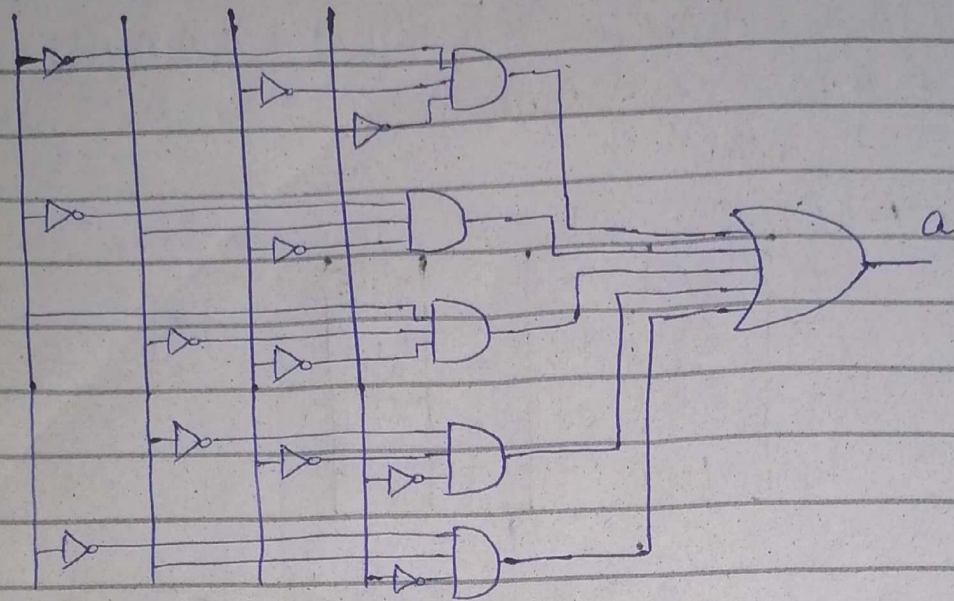
$$\begin{matrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \end{matrix}$$

=

		$A_1 A_0$			
		00	01	11	10
$A_3 A_2$	00	1	0	0	0
	01	1	1	0	1
	11	0	0	0	0
	10	1	1	0	0

$$a = \bar{A}_3 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 + A_3 \bar{A}_2 \bar{A}_1 + \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_0$$

$A_3 \quad A_2 \quad A_1 \quad A_0$

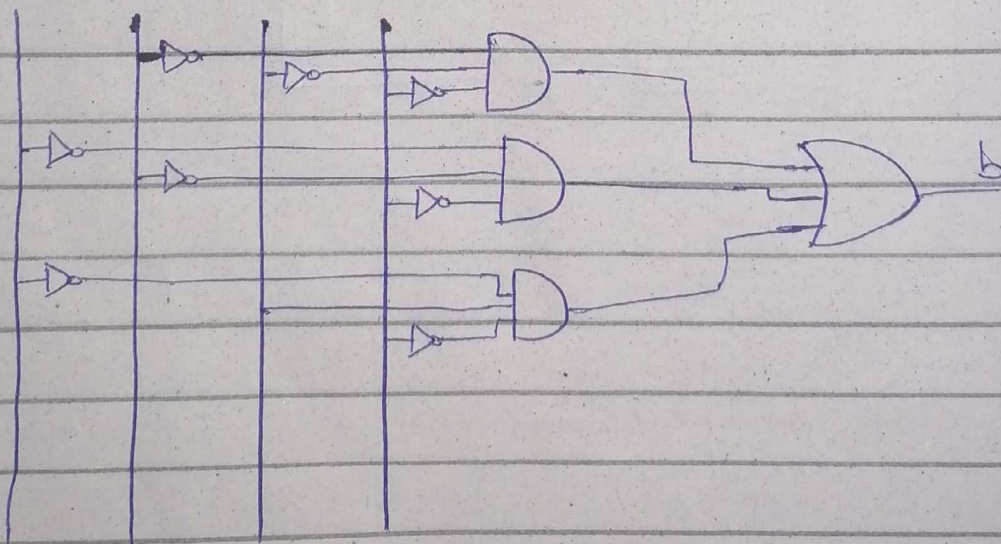


$$b = \overline{A_3} \overline{A_2} \overline{A_1} \overline{A_0} + \overline{A_3} \overline{A_2} A_1 \overline{A_0} + \overline{A_3} A_2 A_1 \overline{A_0} + A_3 \overline{A_2} \overline{A_1} \overline{A_0}$$

$A_3 A_2$	$A_1 A_0$			
	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	0	0	0	0
10	1	0	0	0

$$b = \overline{A_2} \overline{A_1} \overline{A_0} + \overline{A_3} \overline{A_2} \overline{A_0} + \overline{A_3} \overline{A_1} \overline{A_0}$$

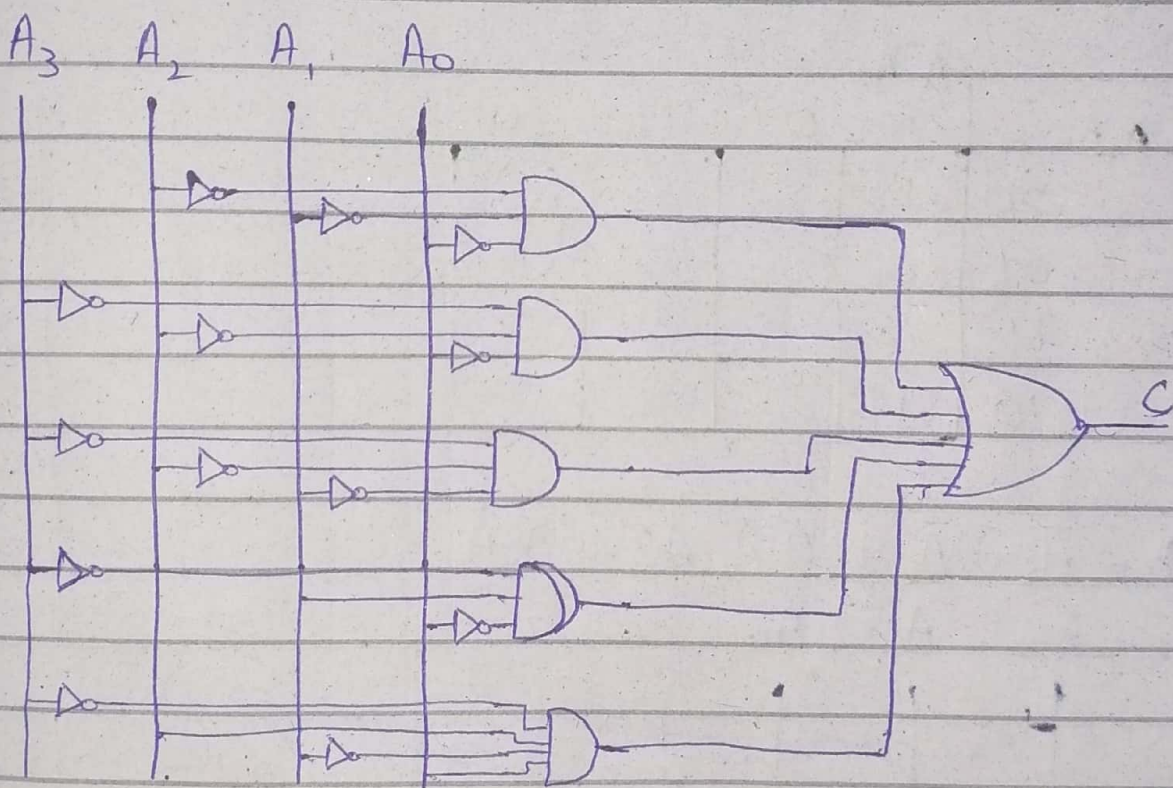
$A_3 \quad A_2 \quad A_1 \quad A_0$



$$C = \overline{A_3}\overline{A_2}\overline{A_1}A_0 + \overline{A_3}\overline{A_2}A_1\overline{A_0} + \overline{A_3}\overline{A_2}A_1A_0 + \overline{A_3}A_2\overline{A_1}A_0 + \overline{A_3}A_2A_1\overline{A_0} + A_3\overline{A_2}\overline{A_1}\overline{A_0}$$

A_3A_2	A_1A_0			
	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	0	0	0	0
10	1	0	0	0

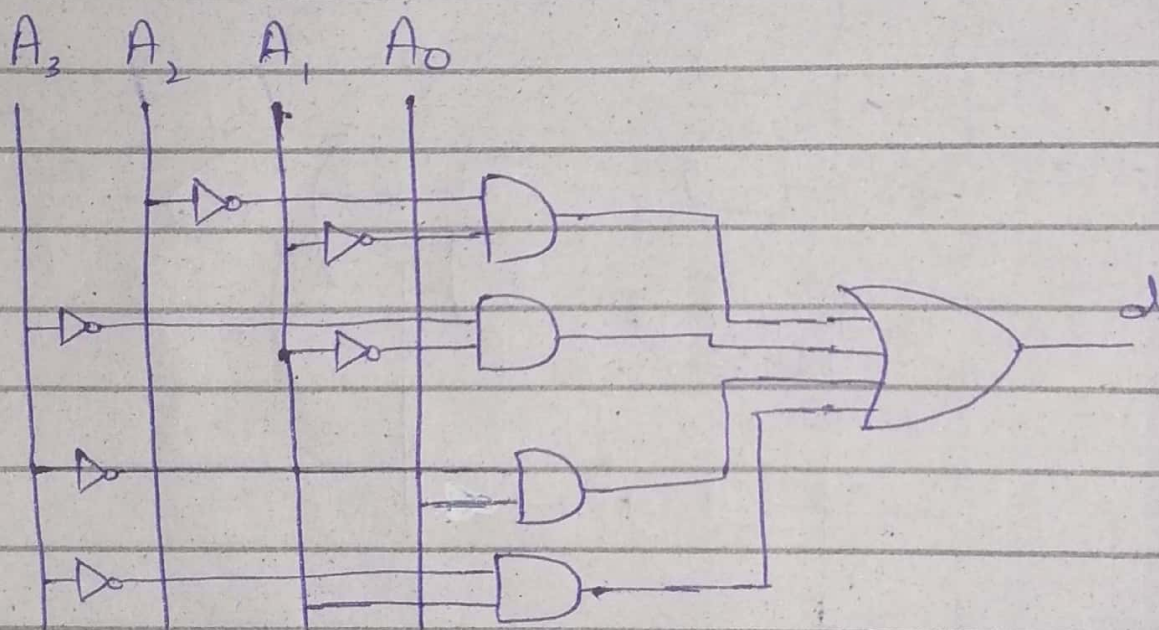
$$C = \overline{A_2}\overline{A_1}\overline{A_0} + \overline{A_3}\overline{A_2}\overline{A_0} + \overline{A_3}\overline{A_1}\overline{A_0} + \overline{A_3}A_1\overline{A_0} + \overline{A_3}A_2\overline{A_1}A_0$$



$$d = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 A_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0$$

		$A_1 A_0$			
		00	01	11	10
$A_3 A_2$	00	1	1	1	0
	01	1	1	1	1
	11	0	0	0	0
	10	1	1	0	0

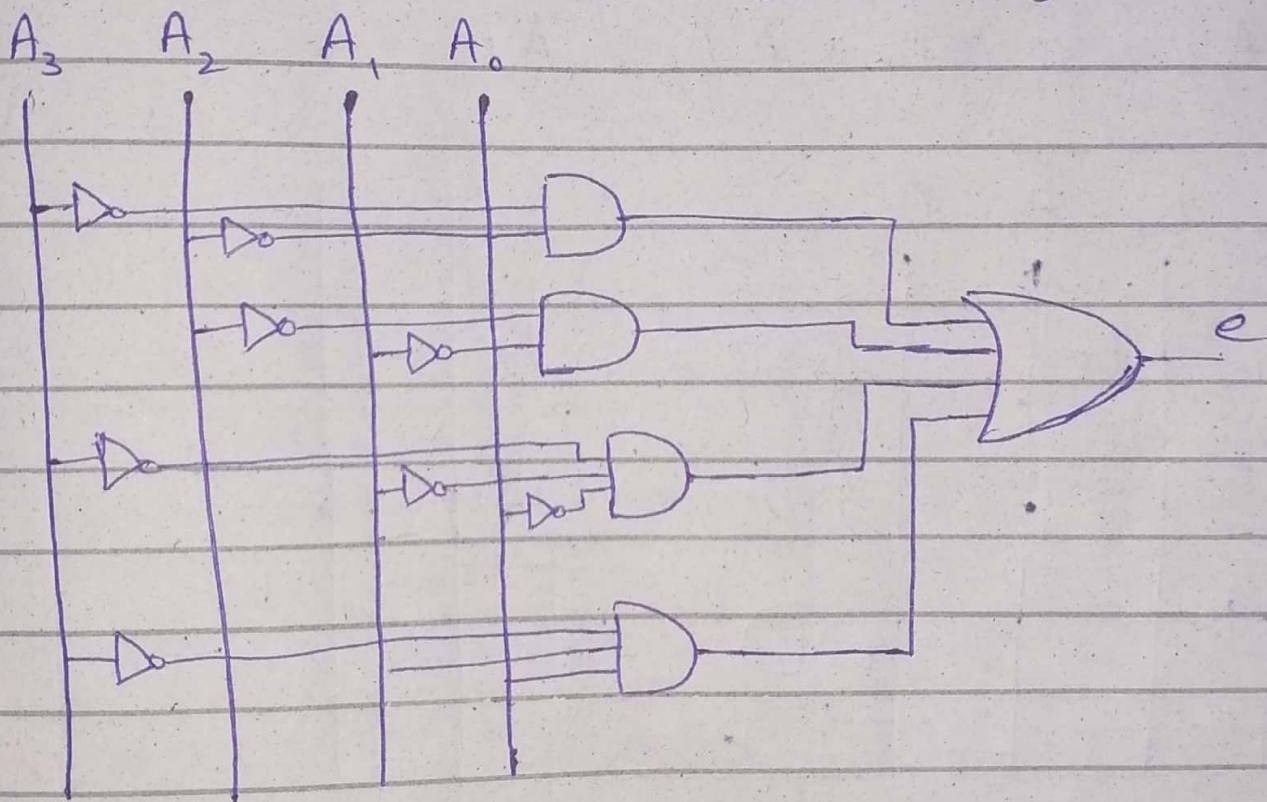
$$d = \bar{A}_2 \bar{A}_1 + \bar{A}_3 \bar{A}_1 + \bar{A}_3 A_0 + \bar{A}_3 A_1$$



$$e = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 A_0$$

		$A_1 A_0$			
		00	01	11	10
$A_3 A_2$	00	1	1	1	1
	01	1	0	1	0
	11	0	0	0	0
	10	1	1	0	0

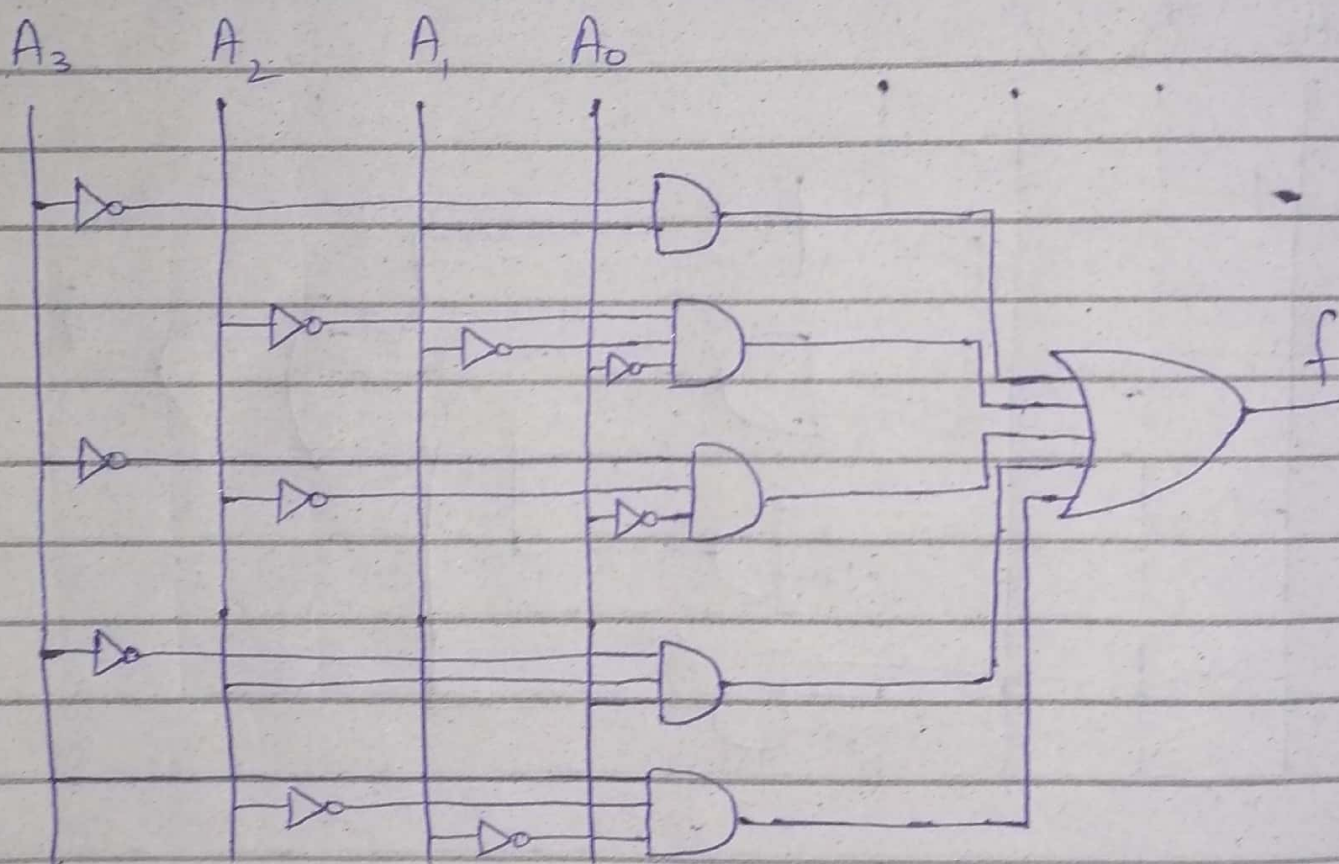
$$e = \bar{A}_3 \bar{A}_2 + \bar{A}_2 \bar{A}_1 + \bar{A}_3 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_1 A_0$$



$$f = \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 A_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$A_3 A_2$	00	01	11	10
00	1	0	1	1
01	0	1	1	1
11	0	0	0	0
10	1	1	0	0

$$f = \bar{A}_3 A_1 + \bar{A}_3 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_0 + \bar{A}_3 A_2 A_0 + A_3 \bar{A}_2 \bar{A}_1$$



$$g = \overset{0\ 0\ 1\ 0}{\bar{A}_3 \bar{A}_2 A_1 \bar{A}_0} + \overset{0\ 0\ 1\ 1}{\bar{A}_3 \bar{A}_2 A_1 A_0} + \overset{0\ 1\ 0\ 0}{\bar{A}_3 A_2 \bar{A}_1 \bar{A}_0} + \overset{0\ 1\ 0\ 1}{\bar{A}_3 A_2 \bar{A}_1 A_0} \\ + \overset{0\ 1\ 1\ 0}{\bar{A}_3 A_2 A_1 \bar{A}_0} + \overset{1\ 0\ 0\ 0}{A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0} + \overset{1\ 0\ 0\ 1}{A_3 \bar{A}_2 \bar{A}_1 A_0} + \overset{1\ 0\ 1\ 0}{A_3 \bar{A}_2 A_1 \bar{A}_0}$$

$A_3 A_2 \backslash A_1 A_0$					
		00	01	11	10
00		0	0	1	1
01		1	1	0	1
11		0	0	0	0
10		1	1	0	0

$$g = \bar{A}_3 A_2 \bar{A}_1 + A_3 \bar{A}_2 \bar{A}_1 + \bar{A}_3 A_2 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 + \bar{A}_3 A_1 \bar{A}_0$$

$A_3 \quad A_2 \quad A_1 \quad A_0$

