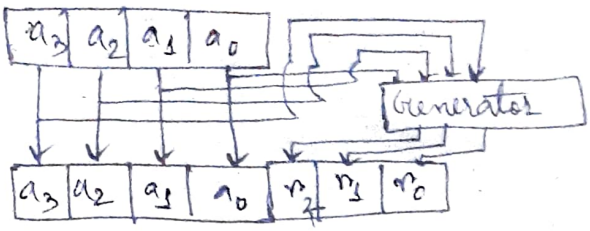
Name - Arkajyoti Naskar
Roll No. - 00911050119146
Sec - A3 ; Class - BCSE-II

(7,4) Hamming Code Generator :-



a_3	a_2	a_1	a_0	r_2	r_1	r_0
0	0	0	0	0	0	0
0	0	0	1	1	0	1
0	0	1	0	1	1	1
0	0	1	1	0	1	0
0	1	0	0	0	1	1
0	1	0	1	1	1	0
0	1	1	0	1	0	0
0	1	1	1	0	0	1
1	0	0	0	1	1	0
1	0	0	1	0	1	1
1	0	1	0	0	0	1
1	0	1	1	1	0	0
1	1	0	0	1	0	1
1	1	0	1	0	0	0
1	1	1	0	0	1	0
1	1	1	1	1	1	1

$r_0 = (a_0 + a_1 + a_2) \% 2$
$r_1 = (a_1 + a_2 + a_3) \% 2$
$r_2 = (a_0 + a_1 + a_3) \% 2$

KMap :-

(i) r_0

a_1a_0 \ a_3a_2	00	01	11	10
00	0	1	1	0
01	1	0	0	1
11	0	1	1	0
10	1	0	0	1

$r_0 = a_2\bar{a}_1\bar{a}_0 + \bar{a}_2\bar{a}_1a_0 + a_2a_1a_0 + \bar{a}_2a_1\bar{a}_0$

(ii) r_1 ⊢

a_1a_0 \ a_3a_2	00	01	11	10
00	0	1	0	1
01	0	1	0	1
11	1	0	1	0
10	1	0	1	0

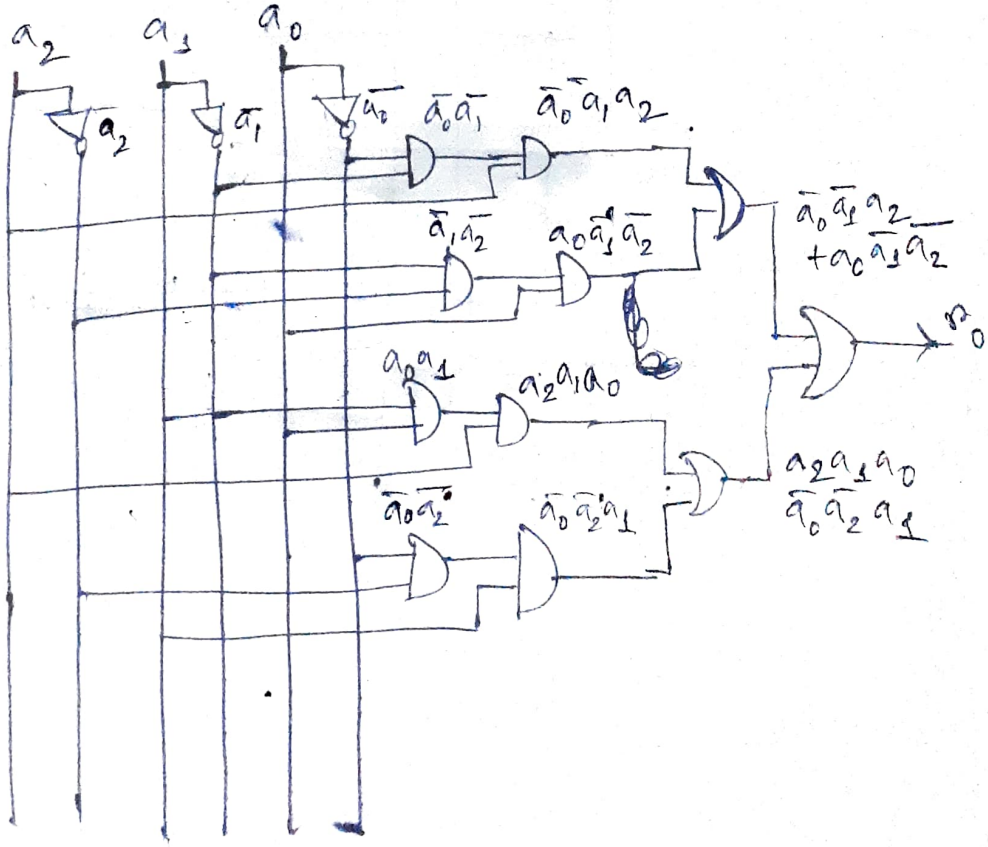
$r_1 = \bar{a}_3 a_2 \bar{a}_1 + a_3 \bar{a}_2 \bar{a}_1 + \bar{a}_3 \bar{a}_2 a_1 + a_3 a_2 a_1$

(iii) r_2 ⊢

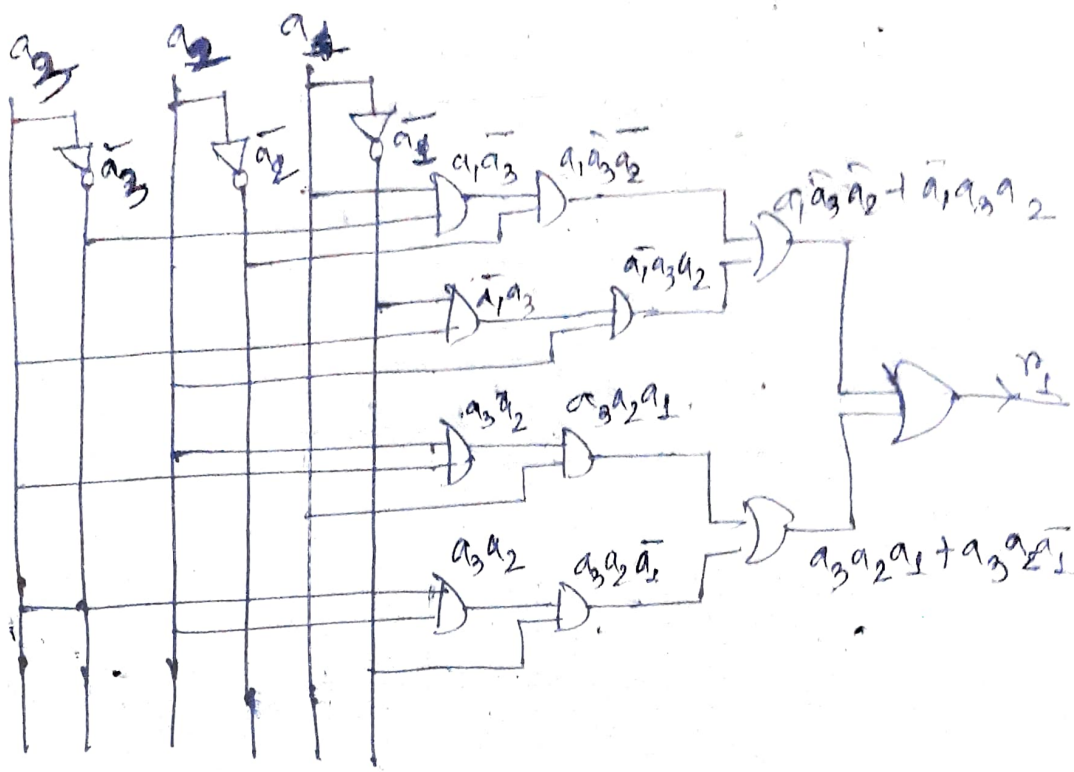
a_1a_0 \ a_3a_2	00	01	11	10
00	0	0	1	1
01	1	1	0	0
11	0	0	1	1
10	1	1	0	0

$r_2 = a_3 \bar{a}_1 \bar{a}_2 + \bar{a}_3 \bar{a}_1 a_0 + a_3 a_1 a_0 + \bar{a}_3 a_1 \bar{a}_0$

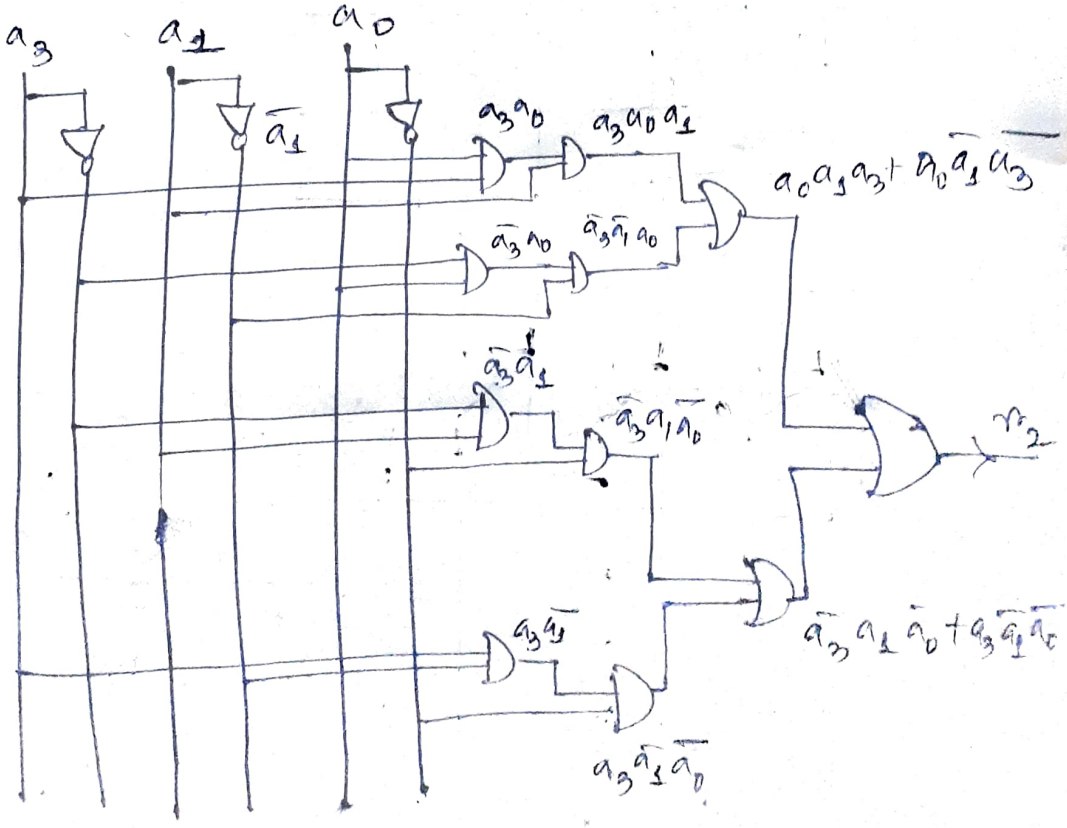
r_0.

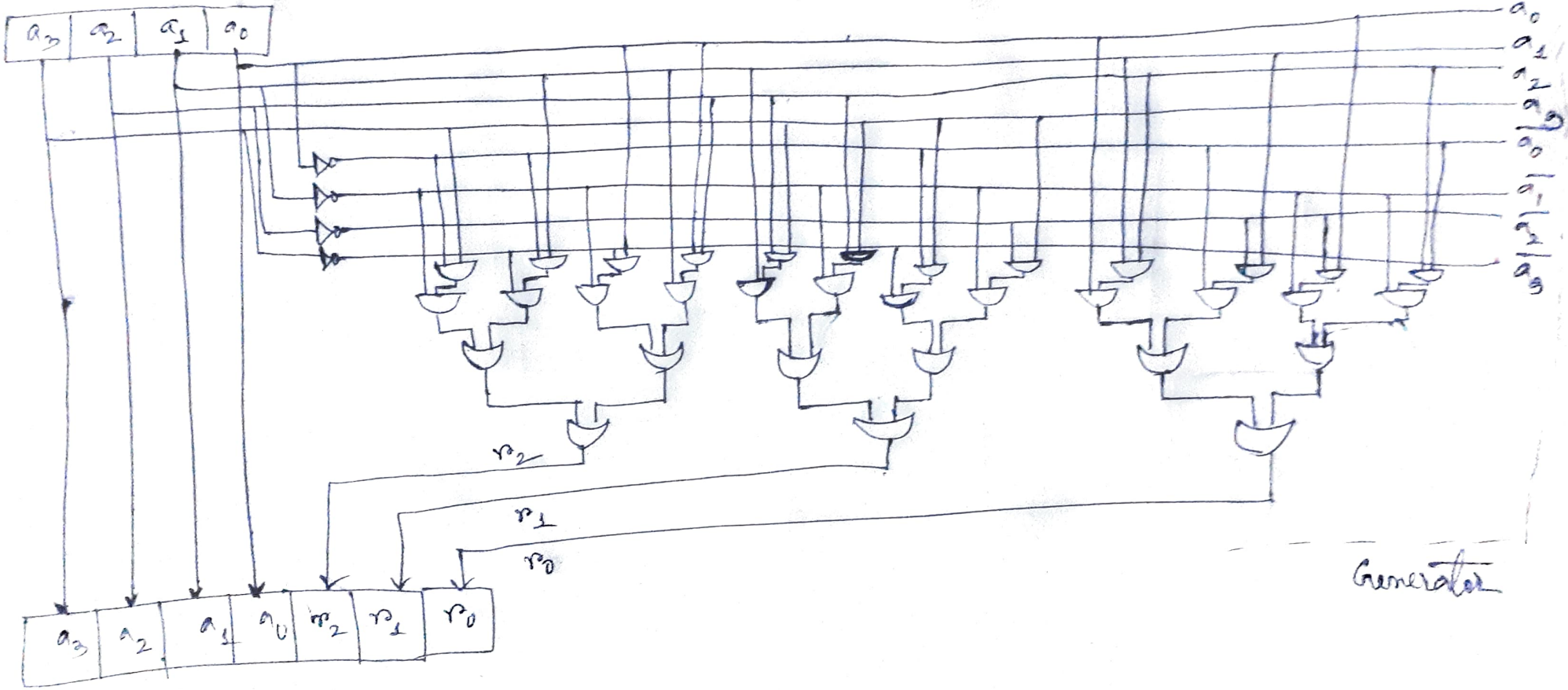


r_1 :-


a_3
a_2
a_1
$\bar{a}_3$
$\bar{a}_2$
$\bar{a}_1$
$a_1\bar{a}_3$
$a_1\bar{a}_3\bar{a}_2$
$\bar{a}_1 a_3$
$a_1 a_3 a_2$
$a_1\bar{a}_3\bar{a}_2 + \bar{a}_1 a_3 a_2$
$a_3 a_2$
$a_3 a_2 a_1$
$a_3 a_2$
$a_3 a_2 \bar{a}_1$
$a_3 a_2 a_1 + a_3 a_2 \bar{a}_1$
r_1

r_2 :-


a_3
a_1
a_0
$\bar{a}_1$
$a_3 a_0$
$a_3 a_0 a_1$
$a_0 a_1 a_3 + a_0 \bar{a}_1 \bar{a}_3$
$\bar{a}_3 a_0$
$a_3 \bar{a}_1 a_0$
$\bar{a}_3 a_1$
$\bar{a}_3 a_1 a_0$
r_2
$a_3 \bar{a}_1$
$\bar{a}_3 a_1 \bar{a}_0 + a_3 \bar{a}_1 a_0$
$a_3 \bar{a}_1 \bar{a}_0$


a3 a2 a1 a0
a0 a1 a2 a3 a0 a1 a2 a3
r2 r1 r0
a3 a2 a1 a0 r2 r1 r0
Generator