① Find Compositon table, of $\langle Z, *7 \rangle$ and bind left coset of $[0]H$ & $[4]H$?

→

$*7$	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6
2	0	2	4	6	1	3	5
3	0	3	6	2	5	1	4
4	0	4	1	5	2	6	3
5	0	5	3	1	6	4	2
6	0	6	5	4	3	2	1

For

$*7$	0	4
0	0	0
4	0	2

Multiplication

$a*H = \{a*h \mid a \in G, h \in H\}$

$a[0]H = \{0\times0, 0\times4\}$

$[0]H \rightarrow \{0,0\}$

$[1]H \rightarrow \{0,4\}$

$[2]H \rightarrow \{0,1\}$

$[3]H \rightarrow \{0,5\}$

$[4]H \rightarrow \{0,2\}$

$[5]H \rightarrow \{0,6\}$

$[6]H \rightarrow \{0,3\}$

02) Even parity of 1011001

→ Given message = 1011001

No of bits = 7 = m

No of parity bits :- $2^p \geq m+p+1$

$2^p \geq 7+p+1$

① p = 3

$2^3 \geq 7+3+1$

$8 \geq 11$

② p = 4

$2^4 \geq 7+4+1$

$16 \geq 12$

p = 4

1 - 0001
2 - 0010
3 - 0011
4 - 0100
5 - 0101
6 - 0110
7 - 0111
8 - 1000
9 - 1001
10 - 1010
11 - 1011

Total No of bits = m+p

= 7+4

= 11

1011001

11	10	9	8	7	6	5	4	3	2	1
m_7	m_6	m_5	P_4	m_4	m_3	m_2	P_3	m_1	P_2	P_1
1	0	1		1	0	0		1		

P_1 = 1, 3, 5, 7, 9, 11

= P_1 1 0 1 1 1

= **P_1 = 0**

P_2 = 2, 3, 6, 7, 10, 11

= P_2 1 0 1 0 1

= **P_2 = 1**

P_3 = 4, 5, 6, 7

= P_3 0 0 1

= **P_3 = 1**

P_4 = 8, 9, 10, 11

= P_4 1 0 1

= **P_4 = 0**

message 10101001110

Error in message $= P_4 P_3 P_2 1$

$= (0110)_{10}$

$= (6)_{10}$

10101001110

↑

Replace 1 by 0 OR 0 by 1

10101101110

Hamming distance (H/d)

mismatching

Q (1) · $C = \{(0000), (0101), (1011), (0111)\}$

→ $x = 0000$

$y = 0101$

$z = 0111$

$w = 0111$

$(x, y) = 2$

$(x, z) = 3$

$(x, w) = 3$

$(y, z) = 3$

$(y, w) = 1$

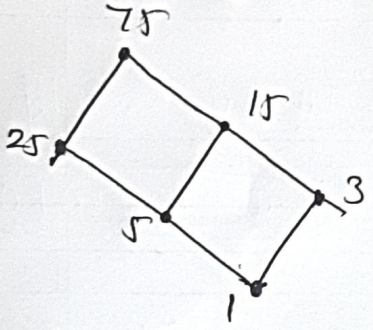
$(z, w) = 2$

minimum Hamming distance →

$H(y, w) = 1$

Q) Draw Lattices $\langle S_n, D \rangle$ $n = 75$ also find GLB, LUB, complement of every element?

→ Lattice diagram



GLB

$*/\wedge$	1	3	5	15	25	75
1	1	1	1	1	1	1
3	1	3	3	3	3	3
5	1	3	5	5	5	5
15	1	3	5	15	15	15
25	1	3	5	15	25	25
75	1	3	5	15	25	75

LUB

$+/\vee$	1	3	5	15	25	75
1	1	3	5	15	25	75
3	3	3	15	15	25	75
5	5	15	5	15	25	75
15	15	15	15	15	25	75
25	25	25	25	25	25	75
75	75	75	75	75	75	75

LUB = 75 GLB = 1

$a \oplus b = 75$ $a * b = 1$

$\{1, 75\}$ *

$1 \oplus 3 = 3$ $a * 3 = 1$

Canonical form

① $f(x,y,z) = xy'+y'z'$

→ $xy'(z+z') + y'z'(x+x')$

$xy'z + xy'z' + xy'z' + x'y'z'$

$xy'z + xy'z' + x'y'z'$

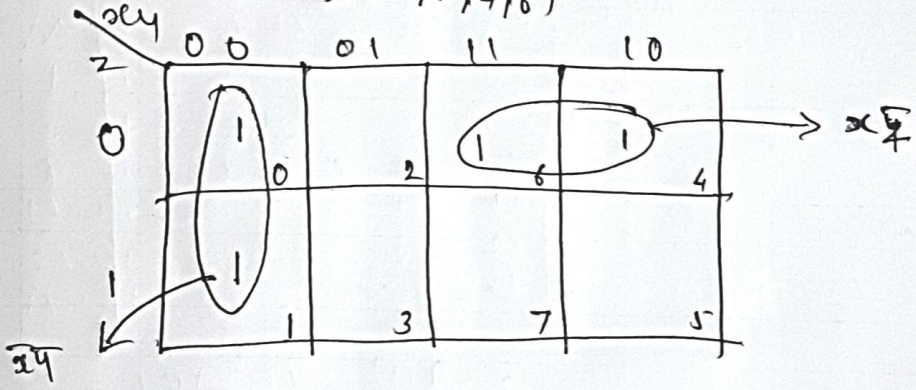
1 0 1 1 0 0 0 0 0

(+) : 5, 4, 0

(+) 0, 4, 5

K-map

$f(x,y,z) = \Sigma(0,1,4,6)$



$y = xz + \bar{x}\bar{y}$

circuit diagram

$f = x+y+z$