Hamming code receiver

- S -> HC -> 101001001111 -> there was some error
- R received was 101011001111

R 101011001111
n=12
m=8
r =4

1 0 1 0 1 1 0 0 1 1 1 1
- c1 c2 m c4 m m m c8 m m m m

-let counter =0
-calculate check bits

3=1+2
5=1+4
6=2+4
7=1+2+4
9=1+8
10=2+8
11=1+2+8
12=4+8

calculated c1=0, c2=0, c4=1, c8=0
received c1=1, c2=0, c4=0, c8=0

counter = sum of all the check bit positions that have discrepancy
=1+4 =5 i.e. 5th bit was in error 1 0 1 0 0 1 0 0 1 1 1 1

Ques A 12-bit hamming code whose hexadecimal value is 0xE4F arrives at a receiver. What was the original value in hexadecimal? Assume that not more than 1 bit is in the error.

n=12, m=8, r=4

received msg = 1110 0100 1111

calculations
c1=1
c2=0
c3=0
c4=0

counter = 2 i.e. 2nd bit is in error
invert 2nd bit
so, corrected codeword = 1010 0100 1111 = 0xA4F

what is the value of msg ? 1010 1111 = 0xAF

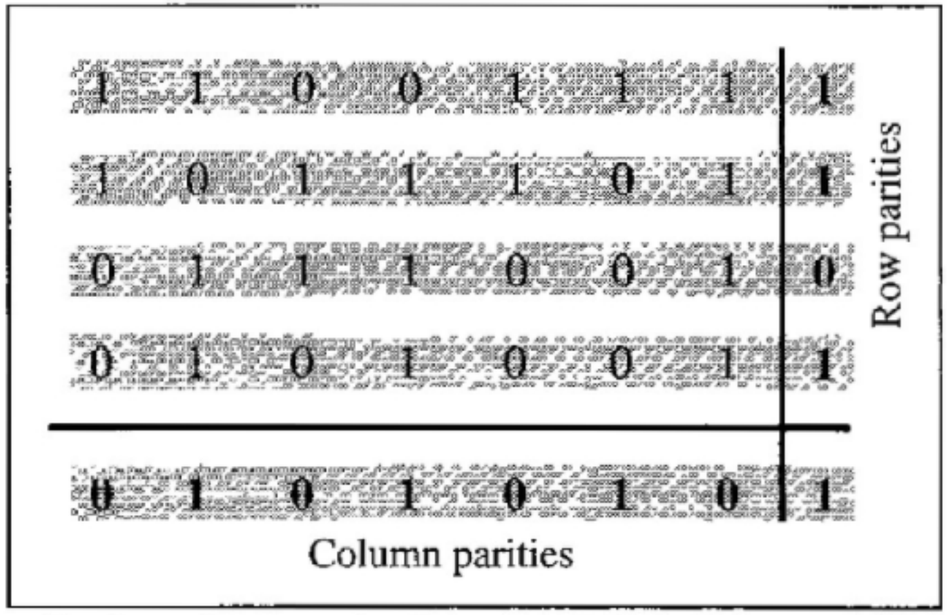
Ques Construct haming code for BCD 0110.

ans 1100110

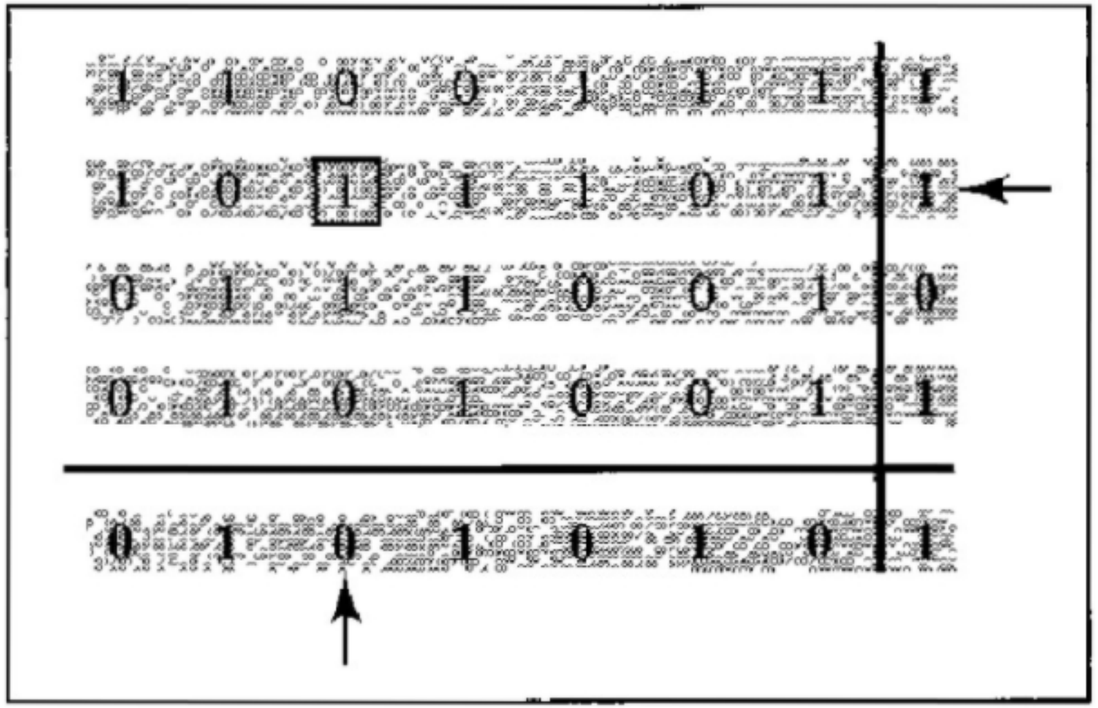
Two-dimensional parity check.

- In this method, the dataword is organized in a table (rows and columns).
- The data to be sent is five 7-bit bytes, are put in separate rows.
- For each row and each column, 1 parity-check bit is calculated. The whole table is then sent to the receiver, which finds the **syndrome for each row and each column**.
- The two-dimensional parity check can detect up to three errors that occur anywhere in the table (arrows point to the locations of the created nonzero syndromes). However, **errors affecting 4 bits** may not be detected.

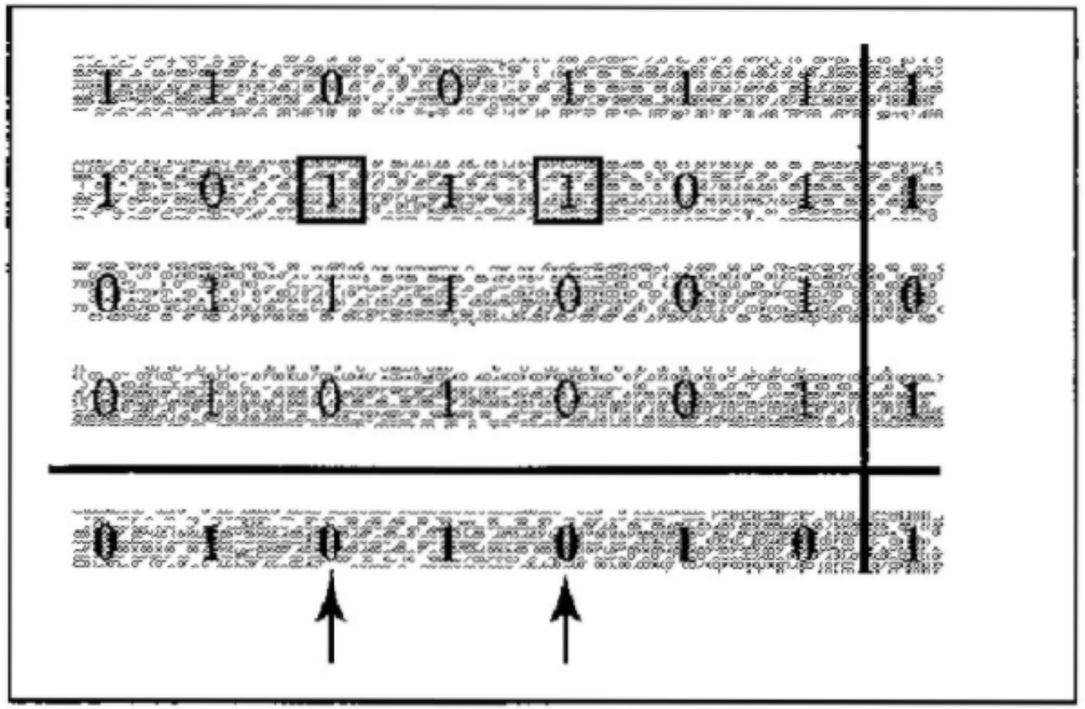
Two-dimensional parity-check code



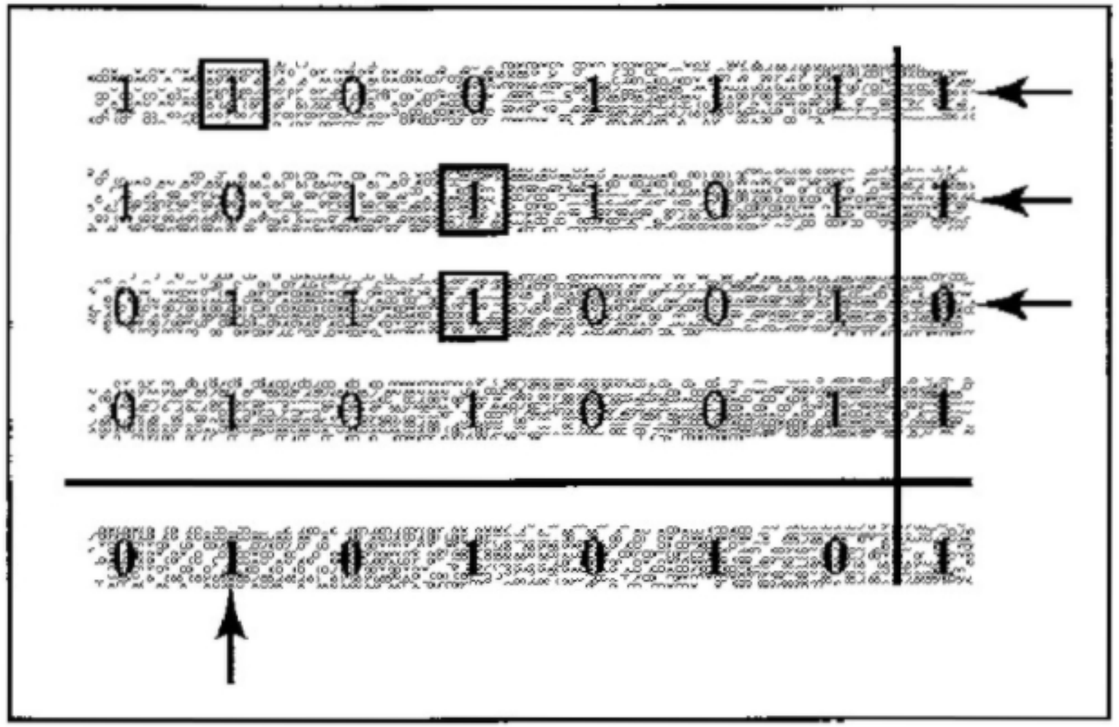
a. Design of row and column parities



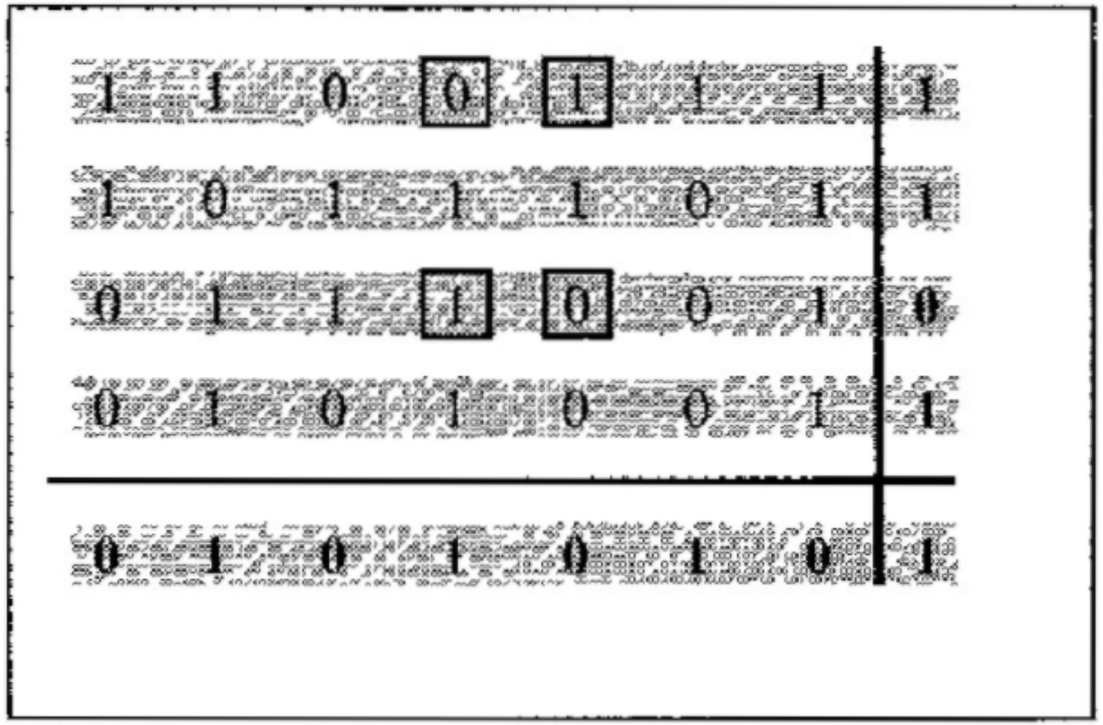
b. One error affects two parities



c. Two errors affect two parities



d. Three errors affect four parities



e. Four errors cannot be detected

c1 10001
c2 00001
c3 10101

sender will send all the codewords in a matrx format i.e.,
3x5

10001
00001
10101