HAMMING CODE EXERCISE

FIND WHAT bits each of p1 p2 p3 p4 will check. Find the Hamming Code??

m=5 and we have to follow $2^p >= m + p + 1$

The value of p as 4 to satisfy 2^4 (16) >= 5 + 4 + 1 but p=3 doesn't satisfy as 2^3 (8) >= 5 + 3 + 1

So p=4 and hence a total of 9 bits

Parity bit positions are 1, 2, 4, 8

And hence hamming code composition is as follow

0001 0010 0011 0100 0101 0110 0111 1000 1001

1 2 3 4 5 6 7 8 9

P_1 P_2 M_1 P_3 M_2 M_3 M_4 P_4 M_5

Now if we see **P_1** has 1 at LSB so message bits with this parity bit are **M_1 M_2 M_4 M_5**

Similarly we see P_2 checks M_1 M_3 M_4

Similarly we see P_3 checks M_2 M_3 M_4

Similarly we see P_4 checks M_5

Or we can also put it as

P_1 checks code bits 1, 3, 5, 7, 9

P_2 checks code bits 2, 3, 6, 7

P_3 checks code bits 4, 5, 6, 7

P_4 checks code bits 8, 9

For message 10110 we hamming code

Bit positions

1 2 3 4 5 6 7 8 9

P_1 P_2 1 P_3 0 1 1 P_4 0

We see P_1=1 to make no. of 1's to 3 i.e. odd

We see P_2=0 to make no. of 1's to 3 i.e. odd

We see P_3=1 to make no. of 1's to 3 i.e. odd

We see P_4=1 to make no. of 1's to 1 i.e. odd

So we get the hamming code as 101101110