LINEAR BLOCK CODE

clc;

clear all;

close all;

n=input('enter the no of bits in the codeword');

k=input('enter the no of bits in the message');

a=n-k;

p=input('enter the parity matrix');

disp(p);

c=eye(k);

g=[c p];

disp('The generator matrix is');

disp(g);

m=input('enter the messge');

c=m\*g;

z=rem(c,2);

disp('codeword hamming distance');

disp(z);

for i=1:2^k

cnt=0;

for j=1:n

if(c(i,j)==1)

cnt=cnt+1;

end

end

z(i,n+1)=cnt;

disp(z(i,n+1));

a(i,1)=cnt;

end

b=sort(a)

dmin=b(2,1);

disp('The minimum distance is dmin=');

disp(dmin);

disp('The error correcting probability of codeword is');

tc=(dmin-1)/2;

disp(tc);

disp('the error detecting capability is');

td=dmin-1;

disp(td);

disp('decoding');

disp('Parity check matrix');

h=[p' eye(n-k)];

disp(h);

disp('Transpose of parity check matrix');

ht=h';

disp(ht);

disp('error vector');

e=eye(n);

disp(e);

disp('syndrome');

s=rem(e\*ht,2);

disp(s);

r=input('enter received codeword');

s=rem(r\*ht,2);

if(s==0)

disp('no error');

else

for i=1:1:size(ht)

if(ht(i,1:3)==s(1,1:3))

r(i)=1-r(i);

break;

end

end

disp('the error is in bit');

disp(i);

disp('the corected codeword is')

disp(r);

end

OUTPUT

enter the no of bits in the codeword 7

enter the no of bits in the message 4

enter the parity matrix [1 0 1; 1 1 1; 1 1 0; 0 1 1]

1 0 1

1 1 1

1 1 0

0 1 1

The generator matrix is

1 0 0 0 1 0 1

0 1 0 0 1 1 1

0 0 1 0 1 1 0

0 0 0 1 0 1 1

enter the messge

[0 0 0 0;0 0 0 1;0 0 1 0;0 0 1 1;0 1 0 0;0 1 0 1;0 1 1 0;0 1 1 1;1 0 0 0;1 0 0 1;1 0 1 0;1 0 1 1;1 1 0 0;1 1 0 1;1 1 1 0;1 1 1 1]

codeword hamming distance

0 0 0 0 0 0 0 0

0 0 0 1 0 1 1 3

0 0 1 0 1 1 0 3

0 0 1 1 1 0 1 4

0 1 0 0 1 1 1 4

0 1 0 1 1 0 0 3

0 1 1 0 0 0 1 3

0 1 1 1 0 1 0 4

1 0 0 0 1 0 1 3

1 0 0 1 1 1 0 4

1 0 1 0 0 1 1 4

1 0 1 1 0 0 0 3

1 1 0 0 0 1 0 3

1 1 0 1 0 0 1 4

1 1 1 0 1 0 0 4

1 1 1 1 1 1 1 7

The minimum distance is dmin=

3

The error correcting probability of codeword is

1

the error detecting capability is

2

decoding

Parity check matrix

1 1 1 0 1 0 0

0 1 1 1 0 1 0

1 1 0 1 0 0 1

Transpose of parity check matrix

1 0 1

1 1 1

1 1 0

0 1 1

1 0 0

0 1 0

0 0 1

error vector

1 0 0 0 0 0 0

0 1 0 0 0 0 0

0 0 1 0 0 0 0

0 0 0 1 0 0 0

0 0 0 0 1 0 0

0 0 0 0 0 1 0

0 0 0 0 0 0 1

syndrome

1 0 1

1 1 1

1 1 0

0 1 1

1 0 0

0 1 0

0 0 1

enter received codeword [1 1 1 1 0 1 1]

the error is in bit

5

the corected codeword is

1 1 1 1 1 1 1