#include<stdio.h>

int data[4],encoded[7],edata[7],syn[3];

int gmatrix[4][7]={{0,1,1,1,0,0,0},{1,0,1,0,1,0,0},{1,1,0,0,0,1,0},{1,1,1,0,0,0,1}};

int hmatrix[3][7]={{1,0,0,0,1,1,1},{0,1,0,1,0,1,1},{0,0,1,1,1,0,1}};

int main(){ int i,j;

printf("Hamming Code encoding\n"); printf("Enter the 4 bit data (one by one): \n"); for(i=0;i<4;i++)scanf("%d",&data[i]); printf("Generator Matrix\n"); for(i=0;i<4;i++){

for(j=0;j<7;j++){ printf("%d",gmatrix[i][j]);} printf("\n");

}

printf("\n\nEncoded data : "); for(i=0;i<7;i++){

for(j=0;j<4;j++)encoded[i]^=(data[j]\*gmatrix[j][i]); printf("%d",encoded[i]);

}

printf("\n\nHamming Code Decoding \n\n"); printf("Enter the encoded bit receieved (one by one) :\n"); for(i=0;i<7;i++)scanf("%d",&edata[i]);

printf("Syndrome = "); for(i=0;i<3;i++){

for(j=0;j<7;j++)syn[i]^=(edata[j]\*hmatrix[i][j]); printf("%d",syn[i]);

}

for(j=0;j<=7;j++) if(syn[0]==hmatrix[0][j]&&syn[1]==hmatrix[1][j]&&syn[2]==hmatrix[2][j])break;

if(j==7)printf("\n\nThe code is error free\n"); else{

printf("\n\nError Receieved at bit no %d of the data\n\n",j+1); edata[j]=!edata[j];

printf("The correct data should be : "); for(i=0;i<7;i++)printf("%d",edata[i]);

}

printf("\n\n"); return 0;

}