

**HAMING CODE:**

```
#include<bits/stdc++.h>
using namespace std;
int find_r(int r){
    int r_bit=1;
    for(int i=0;i<r;i++){
        r_bit=r_bit*2;
    }
    return r_bit;
}

int main(){
    int m,r=0,msg[50],word[60],i,j,k,parity,c;
    cout<<"enter the size of message"<<endl;
    cin>>m;

    while(1){
        if((m+r+1)<=find_r(r))
            break;
        r++;
    }
    cout<<"enter the data bits here..."<<endl;
    for(int i=1;i<=m;i++){
        cin>>msg[i];
    }
    j=1;k=0;
    for(int i=1;i<=(m+r);i++){
        if(i==find_r(k)){
            word[i]=5;
            k++;
        }
        else{
            word[i]=msg[j];
            j++;
        }
    }
    for(i=1;i<=(r+m);i++){
        if(word[i]==5){
            word[i]=0;
            parity=0;
            for(j=i;j<=(m+r);j++){
                for(k=0;k<i;k++){
                    if(word[j]==1){
```

```

        parity++;
    }
    j++;
}
j=j+i-1;
}
if(parity%2==0){
    word[i]=0;
}
else{
    word[i]=1;
}
}
}
/*
for example if m=6 and r=4
so our word_array = m+r=10;
data=1 0 1 1 1 1

    1 2 3 4 5 6 7 8 9 10
    p p d p d d d p d d
*/
cout<<"all the bits including redundant bits are:"<<endl;
for(int i=1;i<=(m+r);i++){
    cout<<word[i]<<" ";
}
cout<<endl;
cout<<"Enter the generated bits..."<<endl;
for(i=1;i<=(m+r);i++){
    //take value from user to create error
    cin>>word[i];
}

c=0;
for(i=1;i<=(m+r);i++){
    if(i==find_r(c)){
        //word[i]=0;
        c++;
        parity=0;
        for(j=i;j<=(m+r);j++){
            for(k=0;k<i;k++){
                if(word[j]==1){
                    parity++;
                }
            }
            j++;
        }
    }
}

```

```

    }
    j=j+i-1;
}
if(word[i]==1){
    parity--;
}

//checking for the error
if(parity%2==0 && word[i]==1){
    cout<<"error occured at position: "<<i<<endl;
    word[i]=0;
    break;
}
if(parity%2==1 && word[i]==0){
    cout<<"error occured at position: "<<i<<endl;
    word[j]=1;
    break;
}
}
}
}
cout<<"Word after the error correction bits are: "<<endl;
for(i=1;i<=(m+r);i++){
    cout<<word[i]<<" ";
}
}
}

```

**OUTPUT:**

```

PS D:\CP\Recursion> cd "d:\CP\Recursion\" ; if ($?) { g++ ruf.cpp -o ruf } ; if ($?) { .\ruf }
enter the size of message
3
enter the data bits here...
1
0
1
all the bits including redundant bits are:
1 0 1 1 0 1
Enter the generated bits...

```

```
1
0
0
1
0
1
error occured at position: 1
Word after the error correction bits are:
0 0 0 1 0 1
```

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