

Program :

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#include<bits/stdc++.h>

using namespace std;
int main(){
    int i,j,k,n;
    cout<<"Enter the message: ";
    string s;
    getline(cin,s);
    cout<<"\nEnter the key: ";
    string key;
    cin>>key;
    for(i=0;i<s.size();i++){
        if(s[i]==' '){
            s.erase(s.begin() + i);
            i--;
        }
    }

    vector<vector<char> > a(5,vector<char>(5,' '));
    vector<int> alpha(26,0);
    alpha[9] = 1; //hide j

    vector<char> cleanKey;
    for(int i=0; i<key.size(); i++){
        if(alpha[key[i]-97] == 0){
            cleanKey.push_back(key[i]);
            alpha[key[i]-97]++;
        }
    }
    sort(cleanKey.begin(), cleanKey.end());

    int pt=0, tra=0;
    for(int i=0; i<5; i++){
        for(int j=0; j<5; j++){
            if(pt<cleanKey.size())
                a[i][j] = cleanKey[pt++];
            else{
                while(alpha[tra] != 0) tra++; //find next 0
                alpha[tra] ++;
            }
        }
    }
}
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        a[i][j] = (char)(tra+97);
    }
}

cout<<endl<<"Key Matrix\n";
n=5;
for(int i=0; i<5; i++){
    for(int j=0; j<5; j++){
        cout<<a[i][j]<<" ";
    }
    cout<<endl;
}

string encr, decr;
for(i=0;i<s.size()-1;i++){
    if(s[i]==s[i+1])
        s.insert(i+1,"x");
}

if(s.size()%2==1)
    s+="x";

map<char,pair<int,int> > mp2;
for(i=0;i<n;i++){
    for(j=0;j<n;j++){
        mp2[a[i][j]] = make_pair(i,j);
    }
}

for(i=0;i<s.size()-1;i+=2){
    int y1 = mp2[s[i]].first;
    int x1 = mp2[s[i]].second;
    int y2 = mp2[s[i+1]].first;
    int x2 = mp2[s[i+1]].second;
    if(y1==y2){
        encr+=a[y1][(x1+1)%5];
        encr+=a[y1][(x2+1)%5];
    }
    else if(x1==x2){
        encr+=a[(y1+1)%5][x1];
    }
}

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        encr+=a[(y2+1)%5][x2];
    }
    else {
        encr+=a[y1][x2];
        encr+=a[y2][x1];
    }
}
cout<<"\nEncrypted Cipher Text : "<<encr<<'\\n';

for(i=0;i<s.size()-1;i+=2){
    int y1 = mp2[encr[i]].first;
    int x1 = mp2[encr[i]].second;
    int y2 = mp2[encr[i+1]].first;
    int x2 = mp2[encr[i+1]].second;

    if(y1==y2){
        decr+=a[y1][(x1-1)%5];
        decr+=a[y1][(x2-1)%5];
    }
    else if(x1==x2){
        decr+=a[(y1-1)%5][x1];
        decr+=a[(y2-1)%5][x2];
    }
    else {
        decr+=a[y1][x2];
        decr+=a[y2][x1];
    }
}
cout<<"Decrypted Plain Text : "<<decr<<'\\n'<<endl;

return 0;
}

```

Output :

```
PS C:\Users\Idris\Documents\College works\CSS> cd
hiper } ; if ($?) { .\playfairChiper }
Enter the message: idris

Enter the key: hockey

Key Matrix
c e h k o
y a b d f
g i l m n
p q r s t
u v w x z

Encrypted Cipher Text :maqlxk
Decrypted Plain Text :idris

PS C:\Users\Idris\Documents\College works\CSS> cd
hiper } ; if ($?) { .\playfairChiper }
Enter the message: cryptography

Enter the key: acid

Key Matrix
a c d i b
e f g h k
l m n o p
q r s t u
v w x y z

Encrypted Cipher Text :fwzoytfsbloi
Decrypted Plain Text :cryptograph

PS C:\Users\Idris\Documents\College works\CSS> |
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