EXPERIMENT NO 01(B)

PROGRAM:

```
#include<iostream>
#include<vector>
#include<map>
#include<string>
using namespace std;


void encryption(string &s, map<char, pair<int,int> > mp, string &ans,
vector<vector<char> > v)
{
    if(s.size()%2==1)
        s += 'x';
    for(int i=0;i<s.size()-1;i++)
    {
        if(s[i]==s[i+1])
        {
            s[i+1] = 'x';
        }
    }


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



        if(y1==y2)
        {
            ans += v[y1][(x1+1)%5];
            ans += v[y1][(x2+1)%5];
        }
        else if(x1==x2)
        {
            ans += v[(y1+1)%5][x1];
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            ans += v[(y2+1)%5][x2];
        }
        else
        {
            ans += v[y1][x2];
            ans += v[y2][x1];
        }
    }
    cout<<"Encrypted message is "<<ans<<endl;
}

void decryption(string ans, map<char, pair<int,int> > mp, vector<vector<char> > v)
{
    string res;
    for(int i=0;i<ans.size()-1;i+=2)
    {
        int y1 = mp[ans[i]].first;
        int x1 = mp[ans[i]].second;
        int y2 = mp[ans[i+1]].first;
        int x2 = mp[ans[i+1]].second;


        if(y1==y2)
        {
             if(x1==0){
                x1=4;
                res += v[y1][x1];
            }
            else{
                res += v[y1][(x1-1)%5];
            }
            if(x2==0){
                x2=4;
                res += v[y2][x2];
            }
            else{
                res += v[y1][(x2-1)%5];
```

```
            }
        }
        else if(x1==x2)
        {
            if(y1==0){
                y1=4;
                res += v[y1][x1];
            }
            else{
                res += v[(y1-1)%5][x1];
            }
            if(y2==0){
                y2=4;
                res += v[y2][x1];
            }
            else{
                res += v[(y2-1)%5][x2];
            }
        }
        else
        {
            res += v[y1][x2];
            res += v[y2][x1];}}
   if(res[res.size()-1] == 'x')
        res[res.size()-1]='\0';

    for(int i=1;i<res.size();i++){
        if(res[i]=='x')
            res[i]=res[i-1];
    }
    cout<<"Decrypted message is "<<res<<endl;
}
int main(){
int n=5,i,j,k, choice;
    string msg, key, s;
    cout<<"Enter Message: ";
    cin>>msg;
```

```
cout<<"Eneter key: ";
cin>>key;
string ans;
map<char,int> m;
vector<vector<char> > v(5, vector<char>(5, ' '));
k=0;

for(i=0;i<msg.size();i++)
{
    if(msg[i]!=' ')
       s+=msg[i];
}

 for(i=0;i<n;i++)
{ (j=0;j<n;j++)
    { (m[key[k]]>0 && k<key.size())
        { k++;}            }
        if(k<key.size())
        {
            v[i][j]=key[k];
            m[key[k]]++;
        }
        if(k==key.size())
           break;
    }
    if(k==key.size())
        break;
}
k=0;
for(;i<n;i++)
{
    for(;j<n;j++)
    {
        while(m[char(k+'a')]>0 && k<26)
        {
            k++;
        }
```

```
        if(char(k+'a') == 'j')
        {
            j--;
            k++;
            continue;
        }
        if(k<26)
        {
            v[i][j]=char(k+'a');
            m[char(k+'a')]++;
        }
    }
    j=0;
}
for(int i=0;i<n;i++)
{
    cout<<"\t";
    for(int j=0;j<n;j++)
    {
        cout<<v[i][j]<<" ";
    }
    cout<<endl;
}
map<char, pair<int,int> > mp;

for(i=0;i<n;i++)
{
    for(j=0;j<n;j++)
    {
        mp[v[i][j]] = make_pair(i,j);
    }
}

   do{
         cout<<"\n1.Encryption \n2.Decryption"<<endl;
    cout<<"\nEnter choice: ";
         cin>>choice;
```

```
    switch(choice){
            case 1:
                    encryption(s, mp, ans, v);
                    break;
            case 2:
                    decryption(ans, mp, v);
                    break;
            case 0:
                    exit(1);
            default:
                    cout<<"Invalid choice"<<endl;
    }
  }while(choice!=0); }
```

OUTPUT:

```
Enter Message: Mohan
Eneter key: monarchy
        m o n a r
        c h y b d
        e f g i k
        l p q s t
        u v w x z

1.Encryption
2.Decryption

Enter choice: 1
Encrypted message is onboaw

1.Encryption
2.Decryption

Enter choice: 2
Decrypted message is mohan
```