```
#include<bits/stdc++.h>
using namespace std;
typedef long long int ll;
ll p,q,n,d,e,phi,i,M,E;
ll gcd(ll a,ll b)
{       if(b==0)
                return a;
        else
                return gcd(b,a%b);
}
ll powm(ll a,ll p)
{       if(p==0)
                return 1;
        ll k=powm(a,p/2);
        k=(k*k)%n;
        if(p%2==1)
                k=(k*a)%n;
        return k;
}
main()
{       string m;
        char dec[10000];
        cout<<"RSA Algorithm"<<endl;
        cout<<"Enter p and q\n";
        cin>>p>>q;
        n=p*q;
        phi=(p-1)*(q-1);

        // now look for public key e that is coprime to phi
        for(i=2;i<n;i++)
                if(gcd(phi,i)==1)
                        break;
        e=i;
        cout<<"e chosen :"<<e<<endl;
        i=1;
        //calculate private key d
        while(1)
                {if((i*e)%phi==1)
                        break;
                i++;
                }
        d=i;
        cout<<"d calculated as " <<d<<endl;
        cout<<"Enter the message\n";
        cin>>m;
        //calculate cipher M^e(mod n)
        for(i=0;i<m.size();i++)
        {M=m[i];
        E=powm(M,e);
        cout<<"Encrypted text"<<E<<endl;

        //DECRYPT NOW
        //RECEIVER KNOWS d computes E^d
        M=powm(E,d);
        cout<<"Decrypted text"<<M<<endl;
        dec[i]=M;
        }
        dec[i]='\0';
        printf("Decrypted text: %s\n",dec);
        return 0;
}
```