Assignment-1

Code :

```cpp
#include<bits/stdc++.h>
using namespace std;

long long  a[] = { 1, 10, 100, 1000, 10000, 100000, 1000000, 10000000, 100000000 };
int middleSquareNumber(int numb, int dig)
{
    long long int sqn = numb * numb, next_num = 0;
    int trim = (dig / 2);
    sqn = sqn / a[trim];
    for (int i = 0; i < dig; i++)
    {
        next_num += (sqn % (a[trim])) * (a[i]);
        sqn = sqn / 10;
    }
    return next_num;
}
void midsq()
{
    cout<<"Enter the seed value :";
    int seed;
    cin>>seed;
    int dig;
    cout<<"Enter the number of digits :";
    cin>>dig;
    int n;
    cout<<"Enter the number of random numbers you want to generate: ";
    cin>>n;
    cout<<"The random numbers are: ";
    cout<<seed<<", ";
    int ni=seed;
    for(int i=1; i<n; ++i)
    {
            ni = middleSquareNumber(ni,dig);
            cout<<ni<<", ";
    }
    cout<<"\n";


}
void residue()
{
    int a,c,M,r;
    cout<<"Enter the value of 'a', 'c' and 'M': ";
    cin>>a>>c>>M;
    cout<<"Enter the number of random numbers you want :";
    int n;
    cin>>n;
    cout<<"Enter the first random number: ";
    cin>>r;
    cout<<"The random numbers are: ";
    cout<<r<<", ";
    int rd=r;
    for(int i=1; i<n; ++i)
    {
```

```cpp
        r= (a*rd+ c)%M;
        rd=r;
        cout<<r<<", ";
    }
    cout<<"\n";

}
void arithmeticCong()
{

int n,a,b,m;
cout<<"Enter the number of random numbers you want to generate :";
cin>>n;
cout<<"Enter the seed values: ";
cin>>a>>b;
cout<<"Enter the value of M";
cin>>m;
int r;
cout<<"The random numbers generated are :";
for(int i=0; i<n; ++i)
{
    r=(a+b)%m;
    b=a;
    a=r;
    cout<<r<<", ";
}
cout<<"\n";
}
int main()
{

    int choice;
    do{
    cout<<"Enter the choice of Algorithm for generating random numbers\n1.Mid
square method\n2.Residue Method\n3.Arithmetic Congruential Method\n4.Exit\n";
    cin>>choice;

    switch(choice)
    {
    case 1: midsq();
        break;
    case 2: residue();
        break;
    case 3: arithmeticCong();
        break;
    case 4:
        break;
    default:
        cout<<"Wrong choice\n";
        break;
    }
    }while(choice<4);
}
```

Output:

```
■ "C:\Users\Ankit Goyal\OneDrive\Documents\labs\8th Sem Lab\SSM\random numbers.exe"
Enter the choice of Algorithm for generating random numbers
1.Mid square method
2.Residue Method
3.Arithmetic Congruential Method
4.Exit
1
Enter the seed value :14
Enter the number of digits :2
Enter the number of random numbers you want to generate: 6
The random numbers are: 14, 19, 36, 29, 84, 5,
Enter the choice of Algorithm for generating random numbers
1.Mid square method
2.Residue Method
3.Arithmetic Congruential Method
4.Exit
2
Enter the value of 'a', 'c' and 'M': 10 5 45
Enter the number of random numbers you want :5
Enter the first random number: 14
The random numbers are: 14, 10, 15, 20, 25,
Enter the choice of Algorithm for generating random numbers
1.Mid square method
2.Residue Method
3.Arithmetic Congruential Method
4.Exit
3
Enter the number of random numbers you want to generate :6
Enter the seed values: 17
13
Enter the value of M42
The random numbers generated are :30, 5, 35, 40, 33, 31,
```