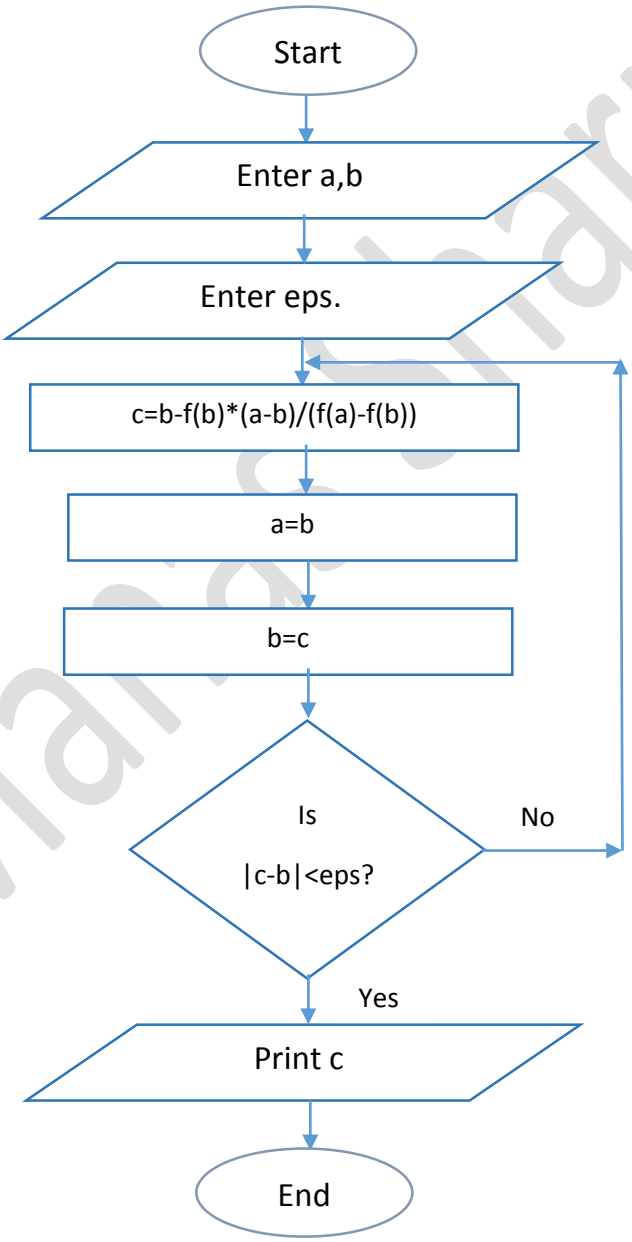
Aim: To find the root of an equation using Secant Method.

Algorithm:

1. Enter the values of initial guesses, a and b.
2. Enter the value of the tolerance error, eps.
3. Repeat
   Set c=b-f(b)*(a-b)/(f(a)-f(b))
   Set a=b
   Set b=c
   Until |cn-c|<Tolerance value(eps)
4. Print 'c', the root in the interval [a,b].

Flow Chart:



Program:

```
//Secant Method for finding the roots of an equation
#include<iostream>
#include<iomanip>
#include<cmath>
using namespace std;
double f(double x);    //declare the function for the given equation
double f(double x)    //define the function here, ie give the equation
{
   double a=x*x*x-2.0*x-5.0;    //write the equation whose roots are to be determined
   return a;
}
int main()
{
cout.precision(6);
cout.setf(ios::fixed);        //set the precision of the output
double a,b,c,e;
int iter=1;
cout<<"Enter the initial guess\na=";
cin>>b;
cout<<"b=";                //take an initial guess
cin>>c;
cout<<"Enter the degree of accuracy\n";
cin>>e;                    //take the desired accuracy
cout<<"Iter"<<setw(12)<<"a"<<setw(12)<<"b"<<setw(12)<<"c"<<setw(12)<<"f(c)"<<setw(12)<<"|cn-
c|"<<endl;
cout<<"_____________________________________________________________________________
____\n";
do
{
   a=b;
   b=c;              //make b equal to the last calculated value of c
   c=b-(b-a)/(f(b)-f(a))*f(b);    //calculate c
   cout<<iter<<setw(16)<<a<<setw(12)<<b<<setw(12)<<c<<setw(12)<<f(c)<<setw(12)<<fabs(c-
b)<<endl;
   if (f(c)==0)
   {
      cout<<"\nThe root of the equation is "<<c;    //print the root
      return 0;
   }
   iter++;
}while(abs(c-b)>e);            //check if the error is greater than the desired accuracy
cout<<"\nThe root of the equation is "<<c<<endl;    //print the root
return 0;
}
```

Output:

For f(x)= 3x+sinx-e^x

```
Enter the initial guess
a=0
b=1
Enter the degree of accuracy
.0000001
Iter            a            b            c          f(c)
_____________________________________________________________________
1        0.0000000    1.0000000    0.4709892    0.2651584
2        1.0000000    0.4709892    0.3075086   -0.1348213
3        0.4709892    0.3075086    0.3626131    0.0054785
4        0.3075086    0.3626131    0.3604613    0.0000995
5        0.3626131    0.3604613    0.3604215   -0.0000001
6        0.3604613    0.3604215    0.3604216    0.0000000

The root of the equation is 0.3604216
```

For f(x)=x^2-2x-5

```
Enter the initial guess
a=2
b=3
Enter the degree of accuracy
.001
Iter            a            b            c          f(c)        |cn-c|
_____________________________________________________________________
1        2.000000     3.000000     2.058824    -0.390800     0.941176
2        3.000000     2.058824     2.081264    -0.147204     0.022440
3        2.058824     2.081264     2.094824     0.003044     0.013560
4        2.081264     2.094824     2.094549    -0.000023     0.000275
```