ASSIGNMENT NO:12 **DATE:10/04/2015**

PROGRAM STATEMENT:Given dy/dx=x^3+y ,y(0)=1,compute y(.02), by Euler's Method taking step length h =.01

THEORY: Euler's method is simple and single-step but a crude numerical method for solving an ordinary initial value differential equation,where the solution will be obtained as a set of variables x and y.

Let us consider a first order and first degree differential eqn as:

***dy/dx*=f(x,y),with $y(x_0)=y_0$.**

Euler's general iteration formula is==>

$$y_n=y_{n-1}+hf(x_{n-1},y_{n-1})=y(x_n)$$

where h the difference between two intervals & f(x,y) is the function of x & y and x_r is the r'th value of x and y_r is the r'th value of y.

PROGRAM CODE:

```
//C Program to Find Solution of Ordinary Differential Equation of 1st Order
by Euler's Method
#include <stdio.h>
#include <math.h>
#define f(x,y) (pow(x,3)+y)
int main()
{
      int i;
      double x,y,h,s;
      printf("f(x,y)=x^3+y\nEnter Value of x::");
      scanf("%lf",&x);
      printf("Enter Value of y for x=%lf::",x);
      scanf("%lf",&y);
      printf("Enter Step length h::");
      scanf("%lf",&h);
      printf("Enter value of x for which y is to be computed::");
      scanf("%lf",&s);
      for(i=1;x<s;i++)
      {
            y=y+(h*f(x,y));
            x=x+h;
            printf("%d\ty(%.2lf)=%.8lf\n",i,x,y);
      }
      return 0;
}
```

OUTPUT:

```
f(x,y)=x^3+y
Enter Value of x::0
Enter Value of y for x=0.000000::1
Enter Step length h::.01
Enter value of x for which y is to be computed::.02
1     y(0.01)=1.01000000
2     y(0.02)=1.02010001
```