**ASSIGNMENT – II**

**SUBJECT- PROCESS MODELING AND SIMULATION (PC-711/PC-711-A)**

**NAME – HAMZA KHAM**

**ROLL NO.- 0101PC181024**

Q.1) Solve the numerical given that X3+2x-2=0 has a root between 0 and 1. Find the root to Two decimal places using the N-R Method. Write the FORTRAN/C/C++-Programming for this problem.

**Solution -**

#include <stdio.h>

#include <math.h>

#define EPSILON 0.0001

float f(float x)

{

return x\*x\*x+2\*x-2;

}

float differentiate (float x)

{

return 3\*x\*x+2;

}

int main()

{

int maxIteration=4, i;

float x1=0,x2=1,x,x0=0.5;

do

{

printf("roots lie between %f and %f\n",x1,x2);

break;

}while(1);

if(fabs(f(x1))< fabs(f(x2)))

x0=x1;

else

x1=x2;

for (i=1;i<=maxIteration;i++)

{

x=x0-(f(x0)/differentiate(x0));

if(fabs(x-x0)<EPSILON)

{

printf("iterations=%d Final Roots=%f\n",i,x);

return 0;

}

printf ("iterations=%d Roots=%f\n",i,x);

x0=x;

}

printf("roots=%f total terations=%d",x,--i);

return 0;

}

Q.2) Find the root of the following equations:

(a) *f*(*x*) = *x*3 – 5*x* + 1

(b) *f*(*x*) = *x*2*ex* – 1

using the Newton–Raphson method

Write the FORTRAN/C/C++- Programming for Both above problem.

**Solution a)-**

#include <stdio.h>

#include <math.h>

#define EPSILON 0.001

float f(float x)

{

return x\*x\*x-5\*x+1;

}

float differentiate (float x)

{

return 3\*x\*x-5;

}

int main()

{

int maxIteration=4, i;

float x1=-1,x2=0,x,x0=-0.5;

do

{

printf("roots lie between %f and %f\n",x1,x2);

break;

}while(1);

if(fabs(f(x1))< fabs(f(x2)))

x0=x1;

else

x1=x2;

for (i=1;i<=maxIteration;i++)

{

x=x0-(f(x0)/differentiate(x0));

if(fabs(x-x0)<EPSILON)

{

printf("iterations=%d Final Roots=%f\n",i,x);

return 0;

}

printf ("iterations=%d Roots=%f\n",i,x);

x0=x;

}

printf("roots=%f total terations=%d",x,--i);

return 0;

}

**Solution b)-**

#include <stdio.h>

#include <math.h>

#define e 0.0001

#define f(x) x\*x\*exp(x)-1

#define df(x) 2\*x\*exp(x)

int main()

{

float x0=0.5,x1,f0,f1,df0;

int i=0;

do

{

f0=f(x0);

df0=df(x0);

x1=x0-(f0/df0);

f1=f(x1);

x0=x1;

i++;

printf("no. of iteration=%d\t",i);

printf("root=%f\t",x1);

printf("value of function=%f\n",f1);

}while(fabs(f1)>e);

return 0;

}