**EXPERIMENT - 08**

**8. Develop a menu driven program to animate a flag using Bezier curve algorithm.**

#include<GL/glut.h>

#include<stdio.h>

#include<math.h>

#define PI 3.1416

typedef struct point

{

GLfloat x, y, z;

};

void bino(int n, int \*C)

{

int k, j;

for(k=0;k<=n;k++)

{

C[k]=1;

for(j=n;j>=k+1; j--)

C[k]\*=j;

for(j=n-k;j>=2;j--)

C[k]/=j;

}

}

void computeBezPt(float u, point \*pt1, int cPt, point \*pt2, int \*C)

{

int k, n=cPt-1;

float bFcn;

pt1 ->x =pt1 ->y = pt1->z=0.0;

for(k=0; k< cPt; k++)

{

bFcn = C[k] \* pow(u, k) \* pow( 1-u, n-k);

pt1 ->x += pt2[k].x \* bFcn;

pt1 ->y += pt2[k].y \* bFcn;

pt1 ->z += pt2[k].z \* bFcn;

}

}

void bezier(point \*pt1, int cPt, int bPt)

{

point bcPt;

float u;

int \*C, k;

C= new int[cPt];

bino(cPt-1, C);

glBegin(GL\_LINE\_STRIP);

for(k=0; k<=bPt; k++)

{

u=float(k)/float(bPt);

computeBezPt(u, &bcPt, cPt, pt1, C);

glVertex2f(bcPt.x, bcPt.y);

}

glEnd();

delete[]C;

}

float theta = 0;

void display()

{

glClear(GL\_COLOR\_BUFFER\_BIT);

int nCtrlPts = 4, nBCPts =20;

point ctrlPts[4] = {{100, 400, 0}, {150, 450, 0}, {250, 350, 0},

{300, 400, 0}};

ctrlPts[1].x +=50\*sin(theta \* PI/180.0);

ctrlPts[1].y +=25\*sin(theta \* PI/180.0);

ctrlPts[2].x -= 50\*sin((theta+30) \* PI/180.0);

ctrlPts[2].y -= 50\*sin((theta+30) \* PI/180.0);

ctrlPts[3].x -= 25\*sin((theta) \* PI/180.0);

ctrlPts[3].y += sin((theta-30) \* PI/180.0);

theta+=0.2;

glClear(GL\_COLOR\_BUFFER\_BIT);

glColor3f(1.0, 1.0, 1.0);

glPointSize(5);

glPushMatrix();

glLineWidth(5);

glColor3f(1, 0.4, 0.2); //Indian flag: Orange color code

for(int i=0;i<50;i++)

{

glTranslatef(0, -0.8, 0);

bezier(ctrlPts, nCtrlPts, nBCPts);

}

glColor3f(1, 1, 1); //Indian flag: white color code

for(int i=0;i<50;i++)

{

glTranslatef(0, -0.8, 0);

bezier(ctrlPts, nCtrlPts, nBCPts);

}

glColor3f(0, 1, 0); //Indian flag: green color code

for(int i=0;i<50;i++)

{

glTranslatef(0, -0.8, 0);

bezier(ctrlPts, nCtrlPts, nBCPts);

}

glPopMatrix();

glColor3f(0.7, 0.5,0.3);

glLineWidth(5);

glBegin(GL\_LINES);

glVertex2f(100,400);

glVertex2f(100,40);

glEnd();

glutPostRedisplay();

glutSwapBuffers();

}

void init()

{

glMatrixMode(GL\_PROJECTION);

glLoadIdentity();

gluOrtho2D(0,500,0,500);

}

void main(int argc, char \*\*argv)

{

glutInit(&argc, argv);

glutInitDisplayMode(GLUT\_DOUBLE | GLUT\_RGB);

glutInitWindowPosition(0, 0);

glutInitWindowSize(500,500);

glutCreateWindow("Bezier Curve");

init();

glutDisplayFunc(display);

glutMainLoop();

}