**Name: Deepankar Sharma course: BCA-6th roll no: 2092014**

**Subject: Computer Graphics**

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NAME- Deepankar Sharma

COURSE- BCA

ROLL NO- 2092014

SUBJECT- Computer graphics lab

PRACTICLE-1

OBJECTIVE- DRAW A SMILEY FACE THOUGH GRAPHICS

SYNTAX :-

#include <graphics.h>

int main()

{

int gr = DETECT, gm;

initgraph(&gr, &gm, "C:\\Turboc3\\BGI");

setcolor(YELLOW);

circle(300, 100, 40);

setfillstyle(SOLID\_FILL, YELLOW);

floodfill(300, 100, YELLOW);

setcolor(BLACK);

setfillstyle(SOLID\_FILL, BLACK);

fillellipse(310, 85, 2, 6);

fillellipse(290, 85, 2, 6);

ellipse(300, 100, 205, 335, 20, 9);

ellipse(300, 100, 205, 335, 20, 10);

ellipse(300, 100, 205, 335, 20, 11);

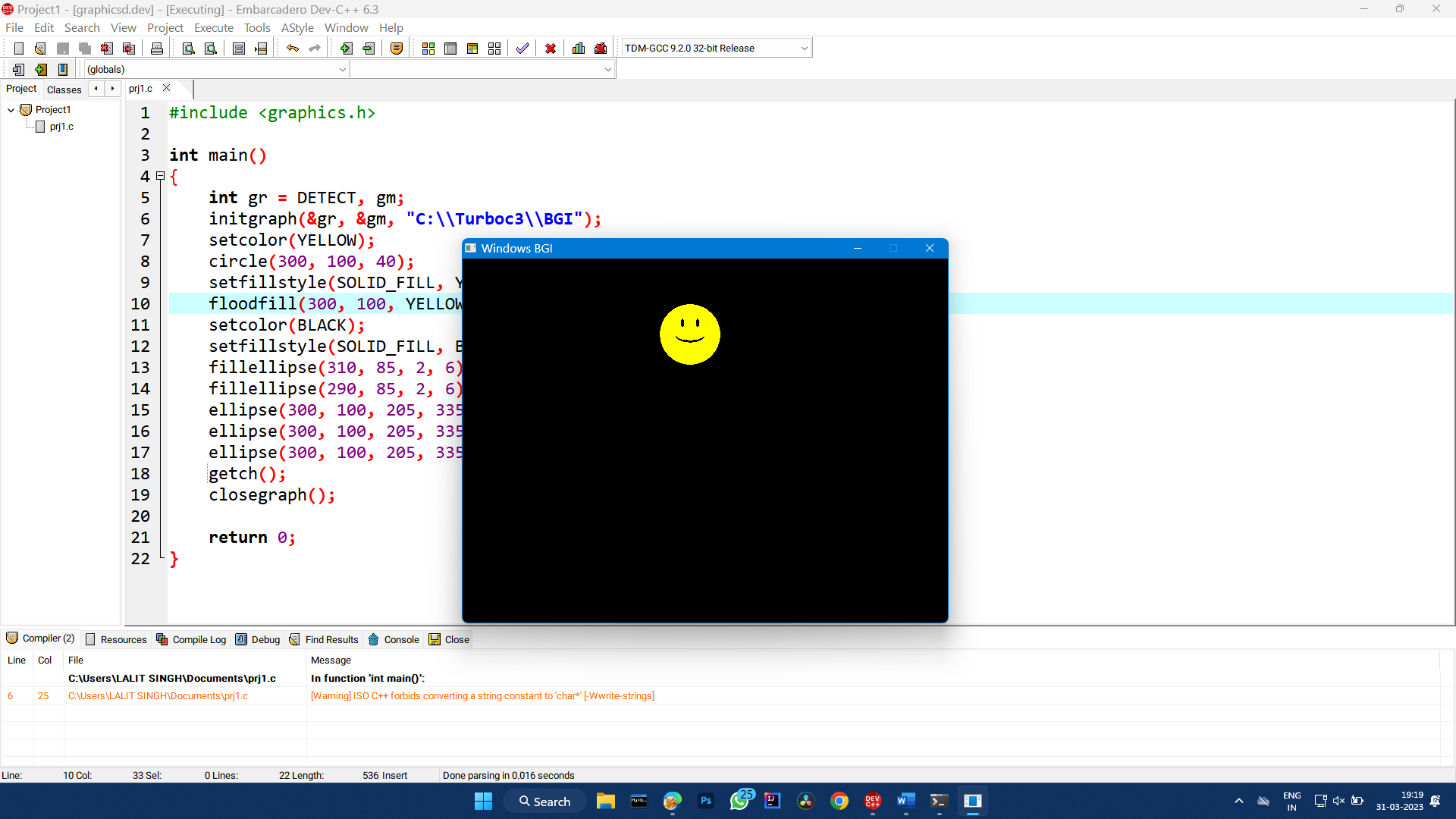
getch();

closegraph();

return 0;

}}

OUTPUT:

****

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PRACTICLE-2

OBJECTIVE- To divide your screen into four region, draw circle, rectangle, ellipse ,square.

SYNTAX :-

#include<conio.h>

#include<graphics.h>

#include<stdio.h>

int main()

{

int gdriver = DETECT, gmode;

int xmax,ymax;

initgraph(&gdriver, &gmode,"c:\\turboc3\\bgi");

xmax = getmaxx();

ymax = getmaxy();

line(xmax/2,0,xmax/2,ymax);

line(0,ymax/2,xmax,ymax/2);

outtextxy (xmax/2,ymax/2,"(0,0)");

setcolor(GREEN);

setfillstyle(HATCH\_FILL,RED);

circle(170,125,100);

outtextxy (160,135,"circle");

floodfill(170,125,GREEN);

setcolor(YELLOW);

setfillstyle(2,RED);

rectangle(58,251,304,392);

outtextxy (70,300,"Rectangle");

floodfill(70,351,YELLOW);

setcolor(BLUE);

setfillstyle(3,RED);

rectangle(400,50,500,150);

outtextxy (450,70,"square");

floodfill(450,80,BLUE);

setcolor(RED);

setfillstyle(4,RED);

ellipse(500,300,0,360,75,25);

outtextxy (500,300,"ellipse");

floodfill(500,300,RED);

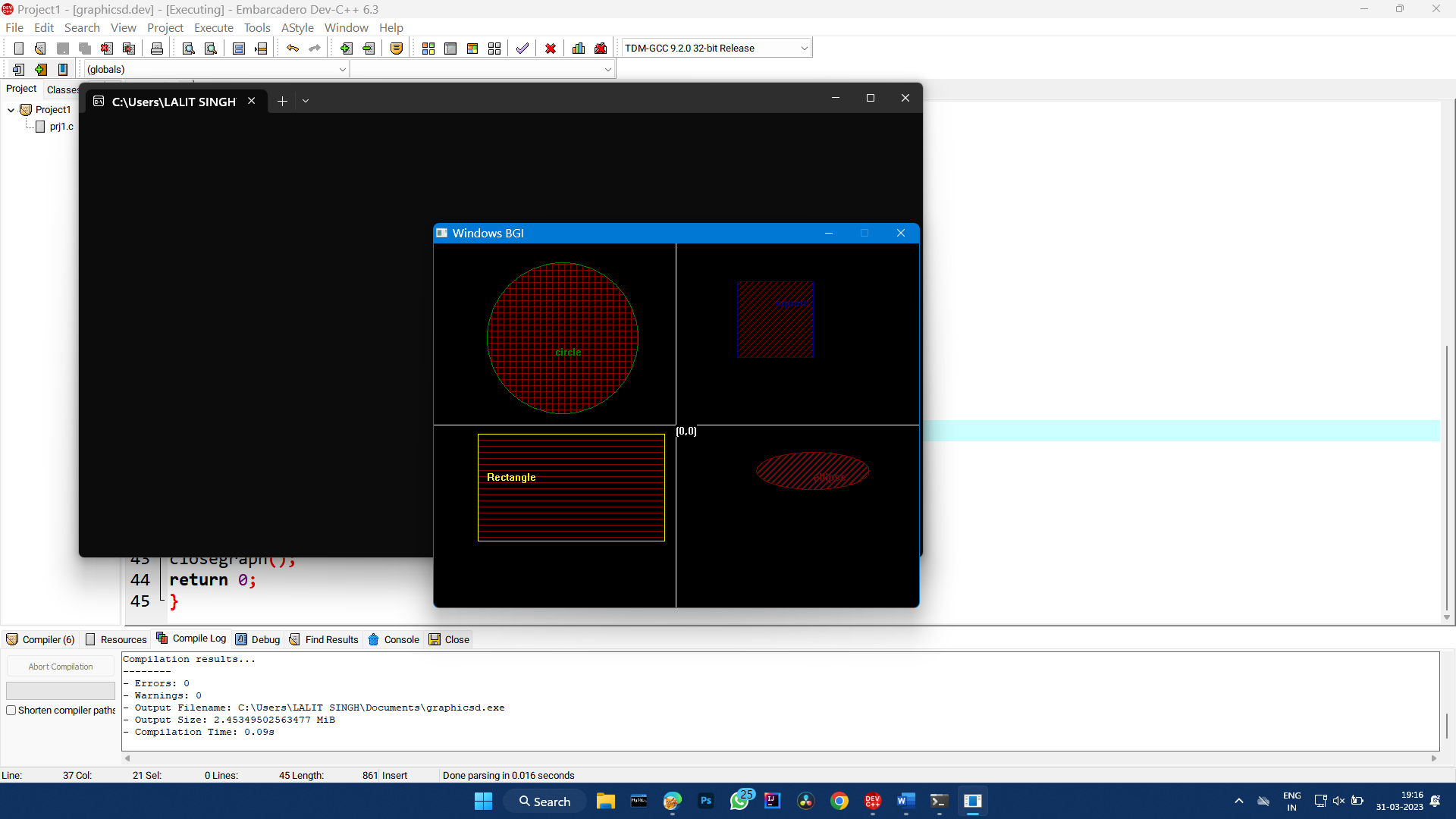
getch();

closegraph();

return 0;

}

OUTPUT:

****

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COURSE- BCA

ROLL NO- 2092014

SUBJECT- Computer graphics lab

PRACTICLE- 3

OBJECTIVE- DRAW A HOUSE THOUGH GRAPHICS

SYNTAX :-

#include <graphics.h>

int main() {

int gd = DETECT, gm;

initgraph(&gd, &gm, "");

rectangle(100, 200, 300, 400);

line(100, 200, 200, 100);

line(200, 100, 300, 200);

rectangle(120, 220, 180, 280);

rectangle(220, 220, 280, 280);

rectangle(160, 320, 240, 400);

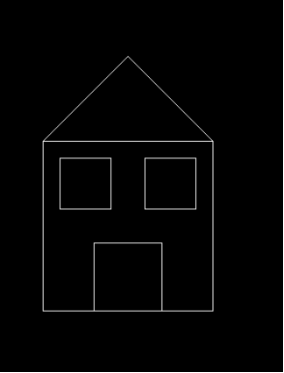
getch();

closegraph();

return 0;

}

OUTPUT:



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SUBJECT- Computer graphics lab

PRACTICLE-4

OBJECTIVE- TO IMPLEMENT THE DDA LINE GENERATION ALGORITHM THOUGH GRAPHICS

SYNTAX :-

#include<graphics.h>

#include<conio.h>

#include<stdio.h>

int main()

{

int gd = DETECT ,gm, i;

float x, y,dx,dy,steps;

int x0, x1, y0, y1;

initgraph(&gd, &gm, "C:\\TC\\BGI");

x0 = 200 , y0 = 300, x1 = 500, y1 = 100;

dx = (float)(x1 - x0);

dy = (float)(y1 - y0);

if(dx>=dy)

{

steps = dx;

}

else

{

steps = dy;

}

dx = dx/steps;

dy = dy/steps;

x = x0;

y = y0;

i = 1;

while(i<= steps)

{

putpixel(x, y, WHITE);

x += dx;

y += dy;

i=i+1;

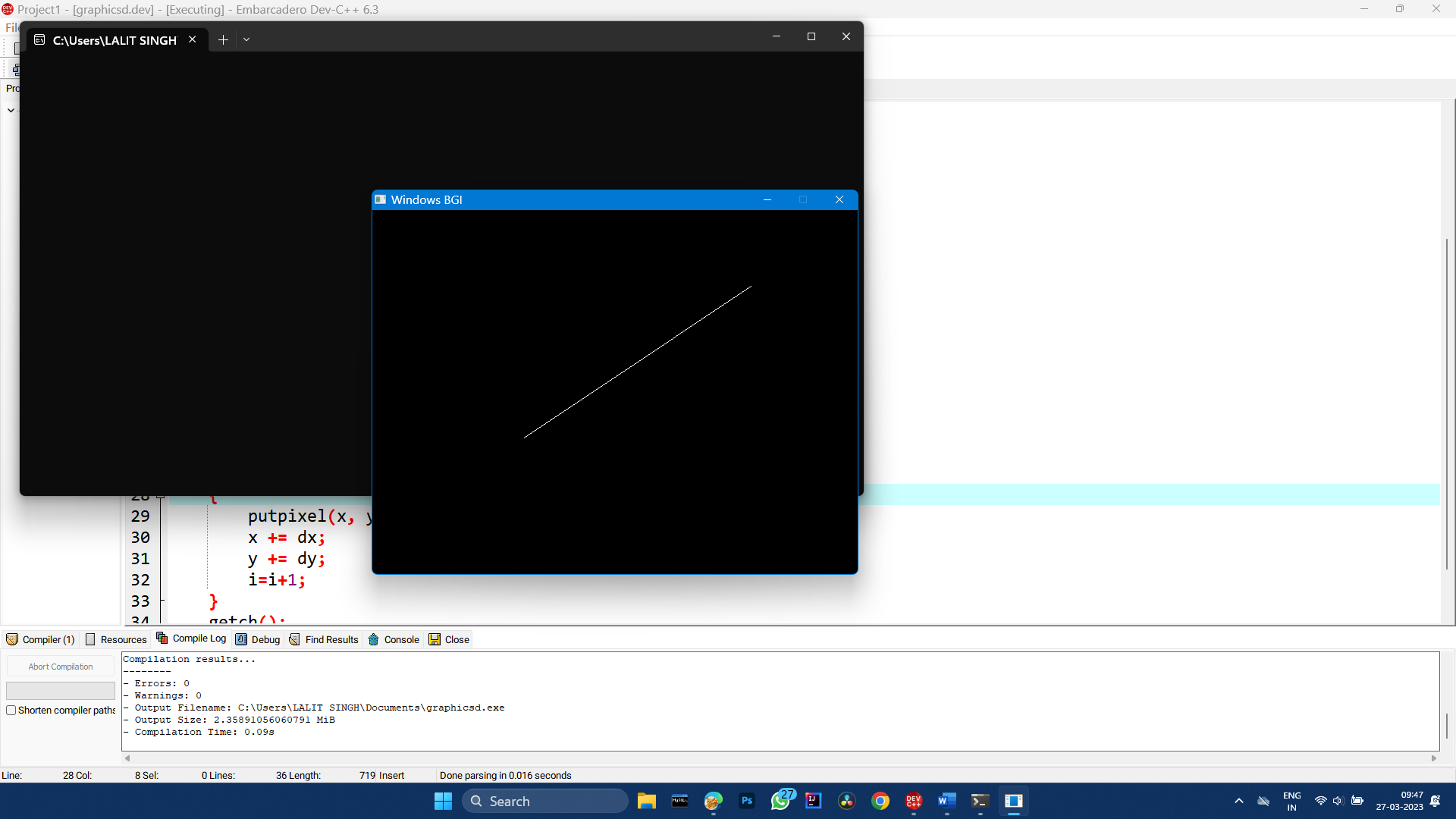
}

getch();

closegraph();

}

OUTPUT:

****

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PRACTICLE-5

OBJECTIVE- TO IMPLEMENT THE Bresenham's Line Algorithm THOUGH GRAPHICS

SYNTAX :-

#include <iostream>

#include <graphics.h>

void bresenham(int x1, int y1, int x2, int y2) {

int dx = x2 - x1;

int dy = y2 - y1;

int p = 2 \* dy - dx;

int twoDy = 2 \* dy;

int twoDyMinusDx = 2 \* (dy - dx);

int x = x1;

int y = y1;

if (x1 > x2) {

x = x2;

y = y2;

x2 = x1;

} else {

x = x1;

y = y1;

}

putpixel(x, y, WHITE);

while (x < x2) {

x++;

if (p < 0) {

p += twoDy;

} else {

y++;

p += twoDyMinusDx;

}

putpixel(x, y, BLUE);

}

}

int main() {

int gd = DETECT, gm;

initgraph(&gd, &gm, "");

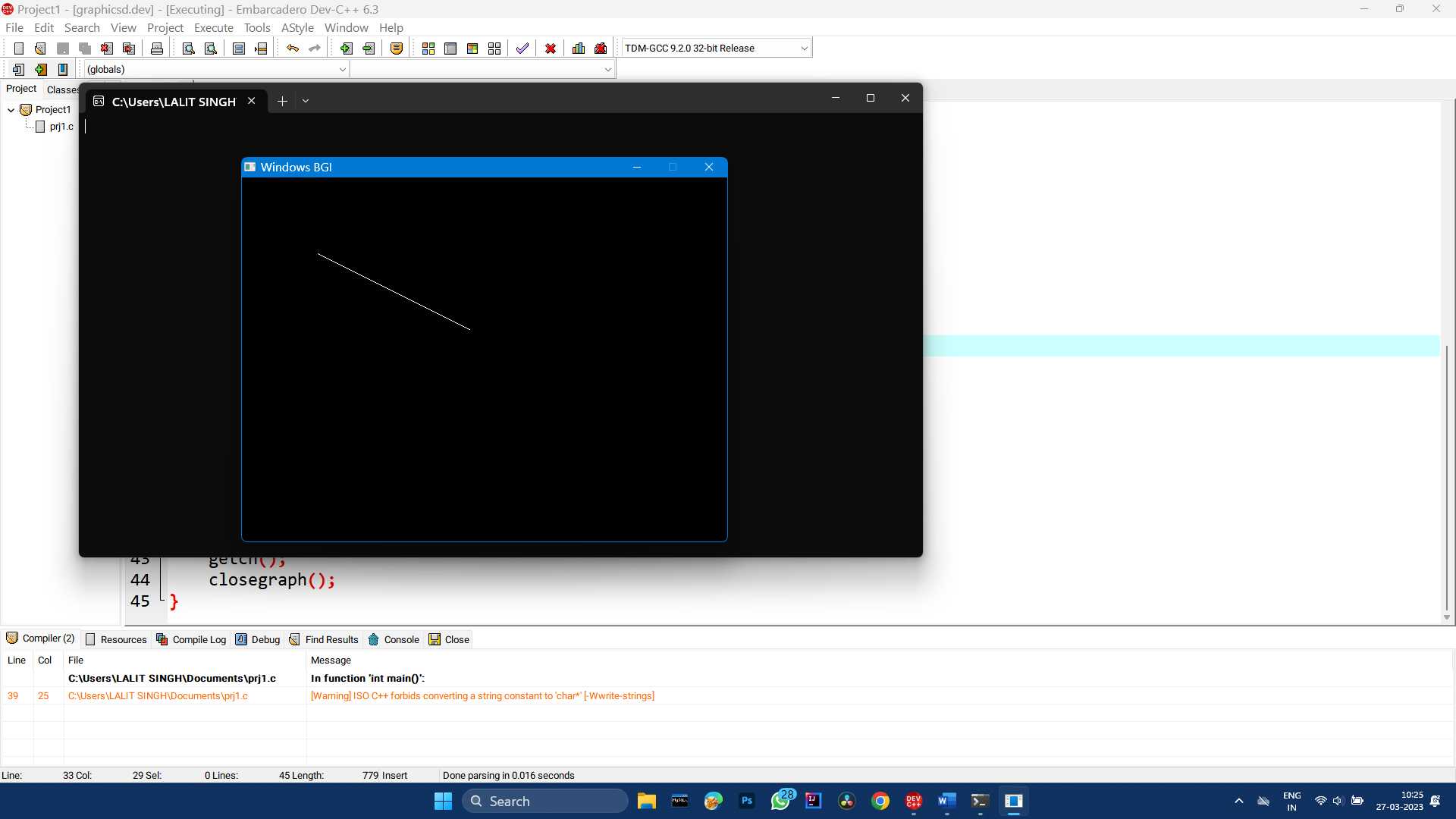
bresenham(100, 100, 300, 200);

getch();

closegraph();

}

OUTPUT:

****

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COURSE- BCA

ROLL NO- 2092014

SUBJECT- Computer graphics lab

PRACTICLE-6

OBJECTIVE- To implement Mid Point Circle drawing Algorithm through graphics.

SYNTAX:-

#include<graphics.h>

#include<iostream>

using namespace std;

// Midpoint Circle drawing Algorithm

void drawMidPointCircle(int x0, int y0, int radius)

{

int x = radius, y = 0;

int decisionParam = 1 - radius;

while (y <= x)

{

putpixel(x0 + x, y0 + y, 1);

putpixel(x0 - x, y0 + y, 2);

putpixel(x0 + x, y0 - y, 3);

putpixel(x0 - x, y0 - y, 4);

putpixel(x0 + y, y0 + x, 5);

putpixel(x0 - y, y0 + x, 6);

putpixel(x0 + y, y0 - x, 7);

putpixel(x0 - y, y0 - x, 8);

y++;

if (decisionParam <= 0)

decisionParam += 2 \* y + 1;

else

{

x--;

decisionParam += 2 \* (y - x) + 1;

}

}

}

int main()

{

int gDrive = DETECT;

int gMode;

initgraph(&gDrive, &gMode, NULL);

int X0 = 0, Y0 = 0, radius=0 ;

printf("The constraint on the X-axis are(0-%d)\n", getmaxx());

printf("The constraint on the Y-axis are(0-%d)\n", getmaxy());

cout<<("Enter the X0: ");

scanf("%d", &X0);

cout<<("Enter the Y0: ");

scanf("%d", &Y0);

cout<<("Enter the radius: ");

scanf("%d", &radius);

// Function call

// DDA(X0, Y0, X1, Y1);

drawMidPointCircle(X0, Y0, radius);

// DDA(2, 2, 14, 16);

getch();

closegraph();

return 0;

}

OUTPUT:-

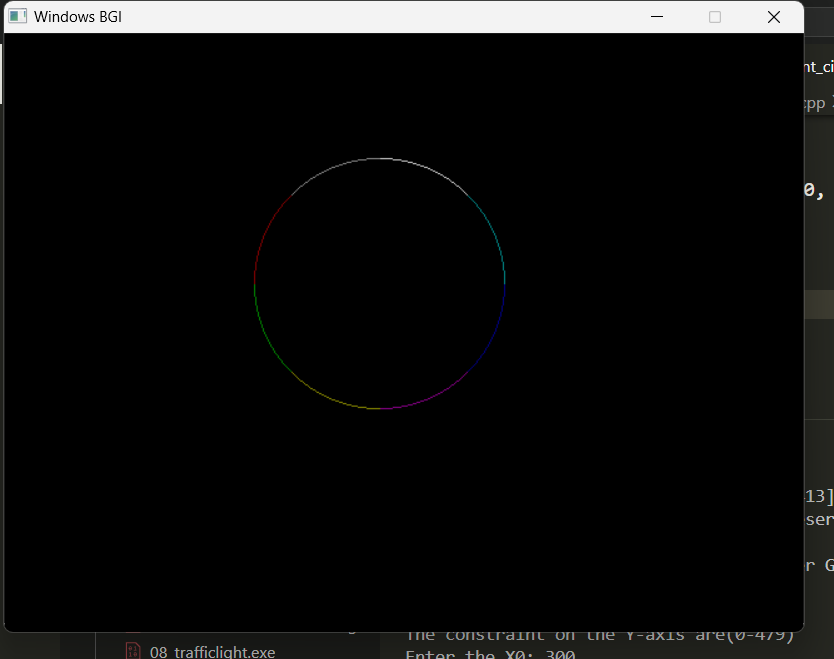
The constraint on the X-axis are(0-639)

The constraint on the Y-axis are(0-479)

Enter the X0: 300

Enter the Y0: 200

Enter the radius: 100



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PRACTICLE-7

OBJECTIVE- To implement Brensanham’s Circle drawing Algorithm through graphics.

SYNTAX:-

#include <graphics.h>

#include <iostream>

using namespace std;

// Midpoint Circle drawing Algorithm

void drawMidPointCircle(int x0, int y0, int radius)

{

int x = radius, y = 0;

int decisionParam = 1 - radius;

while (y <= x)

{

putpixel(x0 + x, y0 + y, 1);

putpixel(x0 - x, y0 + y, 2);

putpixel(x0 + x, y0 - y, 3);

putpixel(x0 - x, y0 - y, 4);

putpixel(x0 + y, y0 + x, 5);

putpixel(x0 - y, y0 + x, 6);

putpixel(x0 + y, y0 - x, 7);

putpixel(x0 - y, y0 - x, 8);

y++;

if (decisionParam <= 0)

decisionParam += 2 \* y + 1;

else

{

x--;

decisionParam += 2 \* (y - x) + 1;

}

}

}

// Brensanham Circle drawing Algorithm

void drawBrensanhamCircle(int x0, int y0, int radius)

{

int x = 0, y = radius;

int decisionParam = 3 - 2 \* radius;

while (x <= y)

{

putpixel(x0 + x, y0 + y, RED);

putpixel(x0 + y, y0 + x, RED);

putpixel(x0 - y, y0 + x, RED);

putpixel(x0 - x, y0 + y, RED);

putpixel(x0 - x, y0 - y, RED);

putpixel(x0 - y, y0 - x, RED);

putpixel(x0 + y, y0 - x, RED);

putpixel(x0 + x, y0 - y, RED);

if (decisionParam <= 0)

{

x++;

decisionParam += 4 \* x + 6;

}

else

{

x++;

y--;

decisionParam += 4 \* (x - y) + 10;

}

}

}

int main()

{

int gDrive = DETECT;

int gMode;

initgraph(&gDrive, &gMode, NULL);

int X0 = 0, Y0 = 0, radius = 0;

printf("The constraint on the X-axis are(0-%d)\n", getmaxx());

printf("The constraint on the Y-axis are(0-%d)\n", getmaxy());

cout << ("Enter the X0: ");

scanf("%d", &X0);

cout << ("Enter the Y0: ");

scanf("%d", &Y0);

cout << ("Enter the radius: ");

scanf("%d", &radius);

// Function call

// DDA(X0, Y0, X1, Y1);

drawBrensanhamCircle(X0, Y0, radius);

// DDA(2, 2, 14, 16);

getch();

closegraph();

return 0;

}

OUTPUT:-

C:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode>"c:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode\Home\build\07\_Bresenham\_circleDrawing.exe"

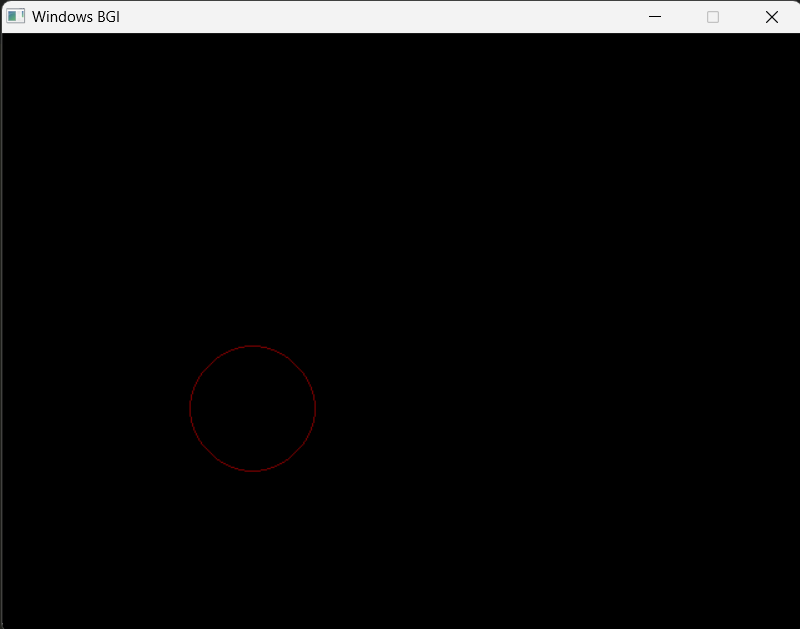
The constraint on the X-axis are(0-639)

The constraint on the Y-axis are(0-479)

Enter the X0: 200

Enter the Y0: 300

Enter the radius: 50



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SUBJECT- Computer graphics lab

PRACTICLE-8

OBJECTIVE- To implement Blinking Traffic Light through graphics.

SYNTAX:-

#include <iostream>

#include <graphics.h>

using namespace std;

void drawTrafficLight(int x, int y, int lightSize, bool isRedOn, bool isYellowOn, bool isGreenOn)

{

// Draw black background

setfillstyle(SOLID\_FILL, BLACK);

bar(x, y, x + lightSize, y + 3 \* lightSize);

// Draw red light

setfillstyle(SOLID\_FILL, isRedOn ? RED : DARKGRAY);

circle(x + lightSize / 2, y + lightSize / 2, lightSize / 2);

floodfill(x + lightSize / 2, y + lightSize / 2, WHITE);

// Draw yellow light

setfillstyle(SOLID\_FILL, isYellowOn ? YELLOW : DARKGRAY);

circle(x + lightSize / 2, y + lightSize + lightSize / 2, lightSize / 2);

floodfill(x + lightSize / 2, y + lightSize + lightSize / 2, WHITE);

// Draw green light

setfillstyle(SOLID\_FILL, isGreenOn ? GREEN : DARKGRAY);

circle(x + lightSize / 2, y + 2 \* lightSize + lightSize / 2, lightSize / 2);

floodfill(x + lightSize / 2, y + 2 \* lightSize + lightSize / 2, WHITE);

}

int main()

{

int gd = DETECT, gm;

initgraph(&gd, &gm, "");

int lightSize = 100;

int x = (getmaxx() - lightSize) / 2;

int y = (getmaxy() - 3 \* lightSize) / 2;

while (true)

{

drawTrafficLight(x, y, lightSize, true, false, false);

delay(400);

drawTrafficLight(x, y, lightSize, true, true, false);

delay(400);

drawTrafficLight(x, y, lightSize, false, false, true);

delay(400);

drawTrafficLight(x, y, lightSize, false, true, false);

delay(400);

}

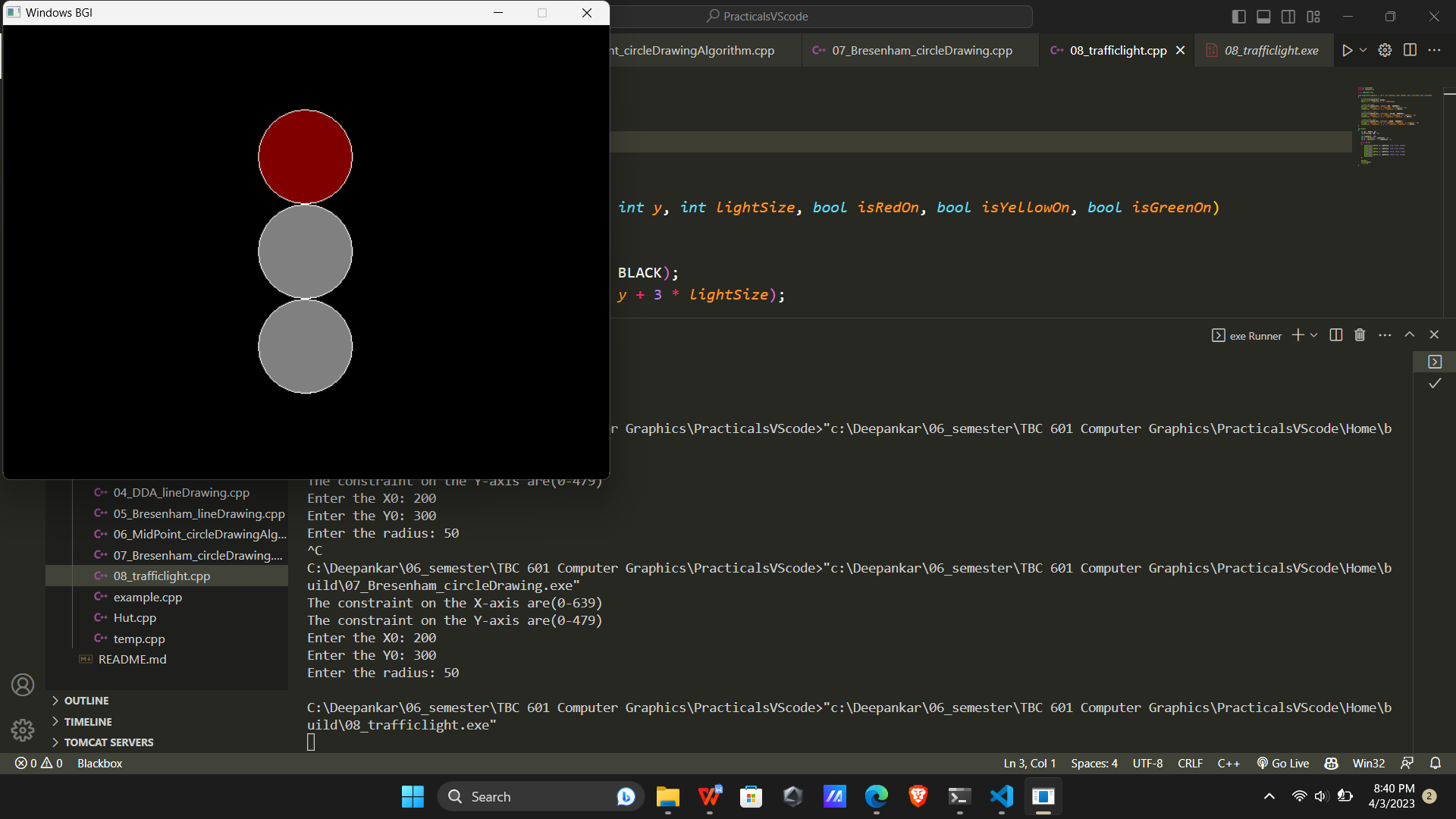
getch();

closegraph();

return 0;

}

OUTPUT:-



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**SUBJECT- Computer graphics lab**

**PRACTICLE-9**

**OBJECTIVE- To implement Point Clipping through graphics.**

**SYNTAX:-**

#include <iostream>

#include <graphics.h>

using namespace std;

void clipPoint(int x, int y, int xmin, int ymin, int xmax, int ymax)

{

if (x < xmin || x > xmax || y < ymin || y > ymax)

{cout << "Point is outside the clipping window\n";

putpixel(x, y, RED);}

else

{cout << "Point is inside the clipping window\n";

putpixel(x, y, GREEN);

outtextxy(x-1, y-1, "(x,y)");}

}

int main()

{

int gd = DETECT, gm;

initgraph(&gd, &gm, NULL);

printf("The constraint on the X-axis are(0-%d)\n", getmaxx());

printf("The constraint on the Y-axis are(0-%d)\n", getmaxy());

int x, y, xmin, ymin, xmax, ymax;

// take input for the clipping window

cout << "Enter the coordinates of the clipping window (xmin): ";

cin >> xmin;

cout << "Enter the coordinates of the clipping window (ymin): ";

cin >> ymin;

cout << "Enter the coordinates of the clipping window (xmax): ";

cin >> xmax ;

cout << "Enter the coordinates of the clipping window (ymax): ";

cin >> ymax;

// draw the clipping window

rectangle(xmin, ymin, xmax, ymax);

// take input for the point to be clipped

cout << "Enter the coordinates of the point to be clipped (x): ";

cin >> x;

cout << "Enter the coordinates of the point to be clipped (y): ";

cin >> y;

// draw the point

putpixel(x, y, WHITE);

delay(1000);

// clip the point

clipPoint(x, y, xmin, ymin, xmax, ymax);

getch();

closegraph();

return 0;

}

**OUTPUT:-**

C:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode>"c:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode\Home\build\09\_PointClipping.exe"

The constraint on the X-axis are(0-639)

The constraint on the Y-axis are(0-479)

Enter the coordinates of the clipping window (xmin): 40

Enter the coordinates of the clipping window (ymin): 40

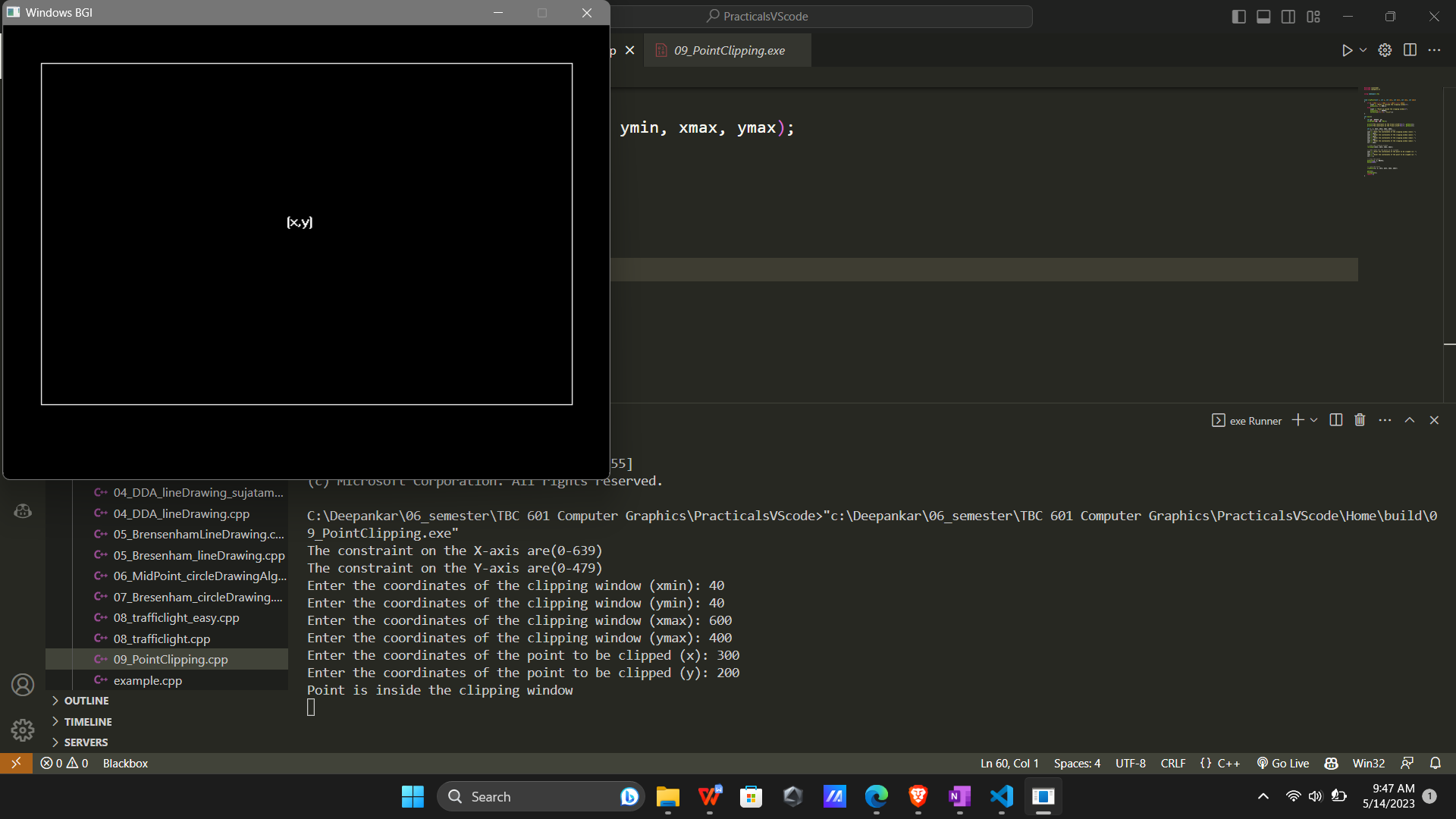
Enter the coordinates of the clipping window (xmax): 600

Enter the coordinates of the clipping window (ymax): 400

Enter the coordinates of the point to be clipped (x): 300

Enter the coordinates of the point to be clipped (y): 200

Point is inside the clipping window



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**SUBJECT- Computer graphics lab**

**PRACTICLE-10**

**OBJECTIVE- To implement Cohen Sutherland Line Clipping Algorithm through graphics.**

**SYNTAX:-**

#include <iostream>

#include <graphics.h>

using namespace std;

const int LEFT= 1; // 0001

const int RIGHT= 2; // 0010

const int BOTTOM= 4; // 0100

const int TOP= 8; // 1000

int xmin, xmax, ymin, ymax;

int getOutcode(int x, int y) {

int code = 0;

if (x < xmin) code |= LEFT;

if (x > xmax) code |= RIGHT;

if (y < ymin) code |= BOTTOM;

if (y > ymax) code |= TOP;

return code;

}

void cohenSutherlandClipLine(int x1, int y1, int x2, int y2) {

int outcode1 = getOutcode(x1, y1);

int outcode2 = getOutcode(x2, y2);

bool accept = false;

while (true) {

if (!(outcode1 | outcode2)) { // trivially accepted -> line clipping window k andar h

accept = true;

break;

}

else if (outcode1 & outcode2) { // trivially rejected -> line is completely invisible

break;

}

else {

int x, y;

int outcode = outcode1 ? outcode1 : outcode2;

if (outcode & TOP) {

x = x1 + (x2 - x1) \* (ymax - y1) / (y2 - y1);

y = ymax;

}

else if (outcode & BOTTOM) {

x = x1 + (x2 - x1) \* (ymin - y1) / (y2 - y1);

y = ymin;

}

else if (outcode & RIGHT) {

y = y1 + (y2 - y1) \* (xmax - x1) / (x2 - x1);

x = xmax;

}

else { // LEFT

y = y1 + (y2 - y1) \* (xmin - x1) / (x2 - x1);

x = xmin;

}

if (outcode == outcode1) {

x1 = x;

y1 = y;

outcode1 = getOutcode(x1, y1);

}

else {

x2 = x;

y2 = y;

outcode2 = getOutcode(x2, y2);

}

}

}

if (accept) {

setcolor(GREEN);

line(x1, y1, x2, y2);

outtextxy(x1, y1, "(x1', y1')");

outtextxy(x2, y2, "(x2', y2')");

}

}

int main() {

int gd = DETECT, gm;

initgraph(&gd, &gm, NULL);

printf("The constraint on the X-axis are(0-%d)\n", getmaxx());

printf("The constraint on the Y-axis are(0-%d)\n", getmaxy());

// take input for the clipping window

cout << "Enter the coordinates of the clipping window (xmin): ";

cin >> xmin;

cout << "Enter the coordinates of the clipping window (ymin): ";

cin >> ymin;

cout << "Enter the coordinates of the clipping window (xmax): ";

cin >> xmax;

cout << "Enter the coordinates of the clipping window (ymax): ";

cin >> ymax;

setcolor(YELLOW);

line(xmin, ymin, xmax, ymin);

line(xmax, ymin, xmax, ymax);

line(xmax, ymax, xmin, ymax);

line(xmin, ymax, xmin, ymin);

int x1 , y1 , x2 , y2 ;

cout << "Enter the coordinates of the line to be clipped (x1): ";

cin >> x1;

cout << "Enter the coordinates of the line to be clipped (y1): ";

cin >> y1;

cout << "Enter the coordinates of the line to be clipped (x2): ";

cin >> x2;

cout << "Enter the coordinates of the line to be clipped (y2): ";

cin >> y2;

cohenSutherlandClipLine(x1, y1, x2, y2);

setcolor(WHITE);

line(x1, y1, x2, y2);

outtextxy(x1, y1, "(x1, y1)");

outtextxy(x2, y2, "(x2, y2)");

getch();

closegraph();

return 0;

}

**OUTPUT:-**

C:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode>"c:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode\Home\build\10\_cohensutherlandlineclipping.exe"

The constraint on the X-axis are(0-639)

The constraint on the Y-axis are(0-479)

Enter the coordinates of the clipping window (xmin): 40

Enter the coordinates of the clipping window (ymin): 50

Enter the coordinates of the clipping window (xmax): 450

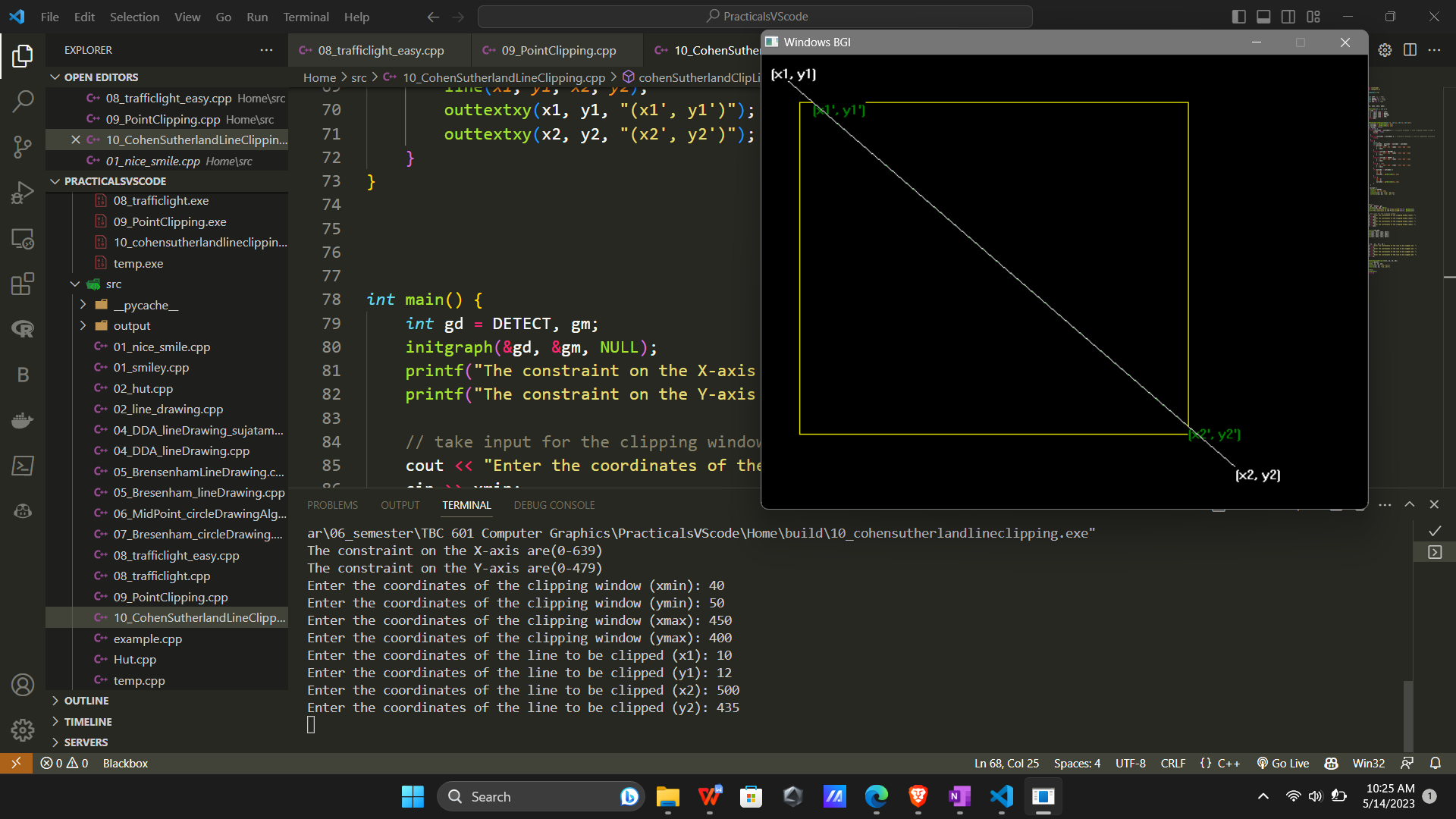
Enter the coordinates of the clipping window (ymax): 400

Enter the coordinates of the line to be clipped (x1): 10

Enter the coordinates of the line to be clipped (y1): 12

Enter the coordinates of the line to be clipped (x2): 500

Enter the coordinates of the line to be clipped (y2): 435



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**COURSE- BCA**

**ROLL NO- 2092014**

**SUBJECT- Computer graphics lab**

**PRACTICLE-11**

**OBJECTIVE- To implement Liang Barsky Line Clipping Algorithm through graphics.**

**SYNTAX:-**

#include <iostream>

#include <graphics.h>

using namespace std;

const int LEFT = 1; // 0001

const int RIGHT = 2; // 0010

const int BOTTOM = 4; // 0100

const int TOP = 8; // 1000

int xmin, xmax, ymin, ymax;

int getOutcode(int x, int y)

{

int code = 0;

if (x < xmin)

code |= LEFT;

if (x > xmax)

code |= RIGHT;

if (y < ymin)

code |= BOTTOM;

if (y > ymax)

code |= TOP;

return code;

}

void cohenSutherlandClipLine(int x1, int y1, int x2, int y2)

{

int outcode1 = getOutcode(x1, y1);

int outcode2 = getOutcode(x2, y2);

bool accept = false;

while (true)

{

if (!(outcode1 | outcode2))

{ // trivially accepted -> line clipping window k andar h

accept = true;

break;

}

else if (outcode1 & outcode2)

{ // trivially rejected -> line is completely invisible

break;

}

else

{

int x, y;

int outcode = outcode1 ? outcode1 : outcode2;

if (outcode & TOP)

{

x = x1 + (x2 - x1) \* (ymax - y1) / (y2 - y1);

y = ymax;

}

else if (outcode & BOTTOM)

{

x = x1 + (x2 - x1) \* (ymin - y1) / (y2 - y1);

y = ymin;

}

else if (outcode & RIGHT)

{

y = y1 + (y2 - y1) \* (xmax - x1) / (x2 - x1);

x = xmax;

}

else

{ // LEFT

y = y1 + (y2 - y1) \* (xmin - x1) / (x2 - x1);

x = xmin;

}

if (outcode == outcode1)

{

x1 = x;

y1 = y;

outcode1 = getOutcode(x1, y1);

}

else

{

x2 = x;

y2 = y;

outcode2 = getOutcode(x2, y2);

}

}

}

if (accept)

{

setcolor(GREEN);

line(x1, y1, x2, y2);

outtextxy(x1, y1, "(x1', y1')");

outtextxy(x2, y2, "(x2', y2')");

}

}

// Function to implement Liang-Barsky algorithm

void LiangBarsky(int x1, int y1, int x2, int y2)

{

int dx = x2 - x1, dy = y2 - y1, p[4], q[4];

float t1 = 0, t2 = 1;

// Calculating p and q values

p[0] = -dx;

p[1] = dx;

p[2] = -dy;

p[3] = dy;

q[0] = x1 - xmin;

q[1] = xmax - x1;

q[2] = y1 - ymin;

q[3] = ymax - y1;

for (int i = 0; i < 4; i++) {

if (p[i] == 0 && q[i] < 0) {

// Line is parallel and outside the clipping window

return;

}

else if (p[i] != 0) {

float t = (float)q[i] / (float)p[i];

if (p[i] < 0 && t > t1) {

t1 = t;

}

else if (p[i] > 0 && t < t2) {

t2 = t;

}

}

}

if (t1 < t2) {

// Line is partially inside the clipping window

int x11 = x1 + t1 \* dx;

int y11 = y1 + t1 \* dy;

int x22 = x1 + t2 \* dx;

int y22 = y1 + t2 \* dy;

setcolor(GREEN);

line(x11, y11, x22, y22);

outtextxy(x11, y11, "(x11, y11)");

outtextxy(x22, y22, "(x22, y22)");

}

}

int main()

{

int gd = DETECT, gm;

initgraph(&gd, &gm, NULL);

printf("The constraint on the X-axis are(0-%d)\n", getmaxx());

printf("The constraint on the Y-axis are(0-%d)\n", getmaxy());

// take input for the clipping window

cout << "Enter the coordinates of the clipping window (xmin): ";

cin >> xmin;

cout << "Enter the coordinates of the clipping window (ymin): ";

cin >> ymin;

cout << "Enter the coordinates of the clipping window (xmax): ";

cin >> xmax;

cout << "Enter the coordinates of the clipping window (ymax): ";

cin >> ymax;

setcolor(YELLOW);

rectangle(xmin,ymin, xmax, ymax);

int x1, y1, x2, y2;

cout << "Enter the coordinates of the line to be clipped (x1): ";

cin >> x1;

cout << "Enter the coordinates of the line to be clipped (y1): ";

cin >> y1;

cout << "Enter the coordinates of the line to be clipped (x2): ";

cin >> x2;

cout << "Enter the coordinates of the line to be clipped (y2): ";

cin >> y2;

setcolor(WHITE);

line(x1, y1, x2, y2);

outtextxy(x1, y1, "(x1, y1)");

outtextxy(x2, y2, "(x2, y2)");

LiangBarsky(x1, y1, x2, y2);

getch();

closegraph();

return 0;

}

**OUTPUT:-**

C:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode>"c:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode\Home\build\11\_LiangBarskyLineClipping.exe"

The constraint on the X-axis are(0-639)

The constraint on the Y-axis are(0-479)

Enter the coordinates of the clipping window (xmin): 50

Enter the coordinates of the clipping window (ymin): 60

Enter the coordinates of the clipping window (xmax): 300

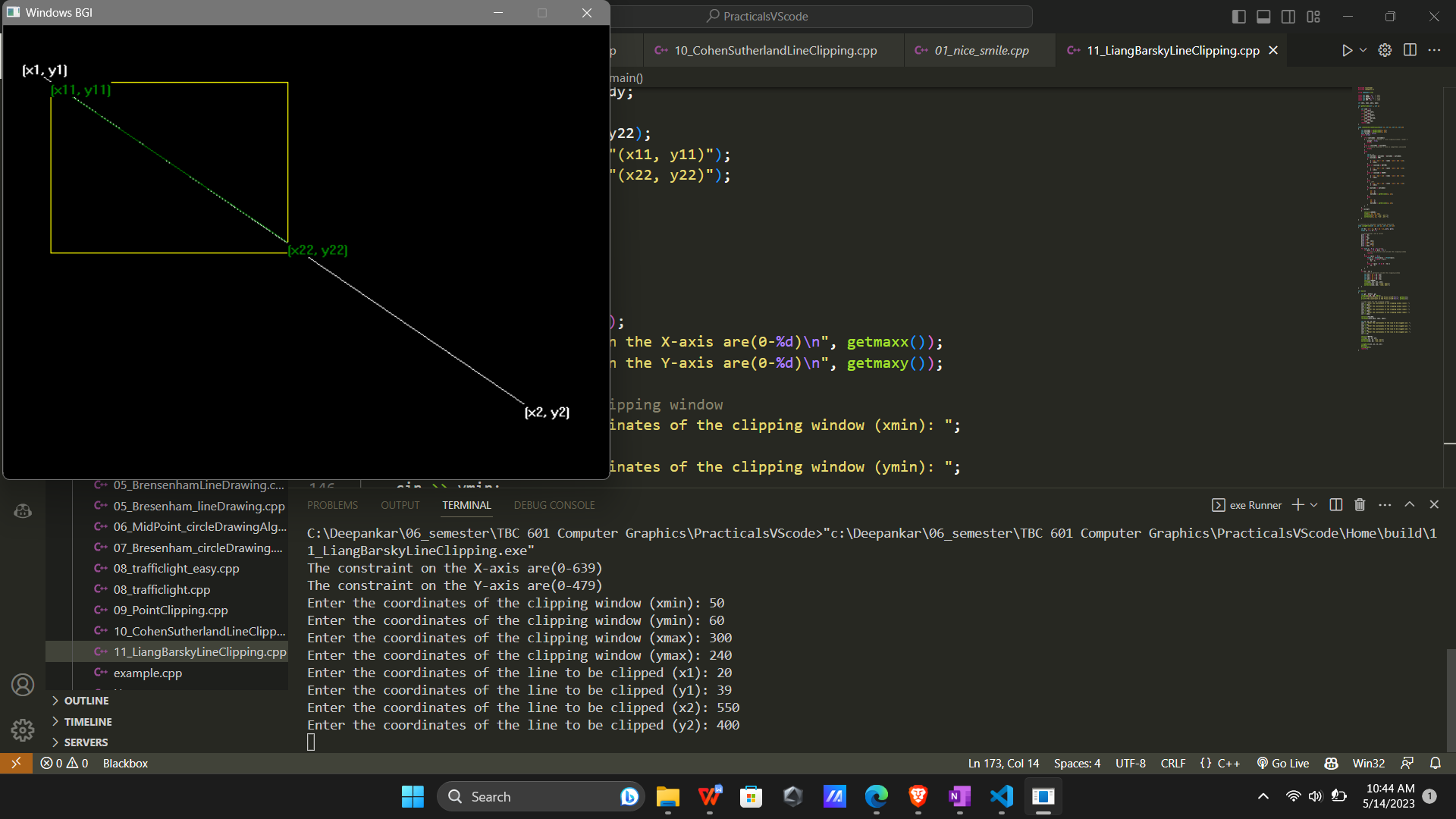
Enter the coordinates of the clipping window (ymax): 240

Enter the coordinates of the line to be clipped (x1): 20

Enter the coordinates of the line to be clipped (y1): 39

Enter the coordinates of the line to be clipped (x2): 550

Enter the coordinates of the line to be clipped (y2): 400



**NAME- Deepankar Sharma**

**COURSE- BCA**

**ROLL NO- 2092014**

**SUBJECT- Computer graphics lab**

**PRACTICLE-12**

**OBJECTIVE- To implement 2D Transformations on a triangle: translation, rotation and scaling.**

**SYNTAX:-**

#include <iostream>

#include <math.h>

#include <graphics.h>

using namespace std;

// Function to draw a triangle

void drawTriangle(int x1, int y1, int x2, int y2, int x3, int y3)

{

line(x1, y1, x2, y2);

line(x2, y2, x3, y3);

line(x3, y3, x1, y1);

}

// Function to translate the triangle

void translateTriangle(int &x1, int &y1, int &x2, int &y2, int &x3, int &y3, int tx, int ty)

{

x1 += tx;

y1 += ty;

x2 += tx;

y2 += ty;

x3 += tx;

y3 += ty;

// drawTriangle( x1, y1, x2, y2, x3, y3);

}

// Function to rotate the triangle

void rotateTriangle(int &x1, int &y1, int &x2, int &y2, int &x3, int &y3, float angle)

{

float radians = angle \* 3.14159 / 180;

float cosVal = cos(radians);

float sinVal = sin(radians);

int tempX1 = x1;

int tempX2 = x2;

int tempX3 = x3;

int tempY1 = y1;

int tempY2 = y2;

int tempY3 = y3;

x1 = tempX1 \* cosVal - tempY1 \* sinVal;

y1 = tempX1 \* sinVal + tempY1 \* cosVal;

x2 = tempX2 \* cosVal - tempY2 \* sinVal;

y2 = tempX2 \* sinVal + tempY2 \* cosVal;

x3 = tempX3 \* cosVal - tempY3 \* sinVal;

y3 = tempX3 \* sinVal + tempY3 \* cosVal;

}

// Function to scale the triangle

void scaleTriangle(int &x1, int &y1, int &x2, int &y2, int &x3, int &y3, float sx, float sy)

{

x1 \*= sx;

y1 \*= sy;

x2 \*= sx;

y2 \*= sy;

x3 \*= sx;

y3 \*= sy;

}

int main()

{

int gd = DETECT, gm;

initgraph(&gd, &gm, "");

int x1 = 2, y1 = 3, x2 = 70, y2 = 150, x3 = 120, y3 = 60;

int originalx1 = 2, originaly1 = 3, originalx2 = 70, originaly2 = 150, originalx3 = 120, originaly3 = 60;

int choice;

int tx, ty;

float angle;

float sx, sy;

int originx= getmaxx()/2;

int originy= getmaxy()/2;

outtextxy(originx, originy, "(0, 0)");

while (true)

{

cleardevice();

x1= originalx1;

x2= originalx2;

x3= originalx3;

y1= originaly1;

y2= originaly2;

y3= originaly3;

// Draw the quadrants

setcolor(WHITE);

line(getmaxx() / 2, 0, getmaxx() / 2, getmaxy());

line(0, getmaxy() / 2, getmaxx(), getmaxy() / 2);

// Draw the original triangle

drawTriangle(originx+ originalx1, originy- originaly1, originx+ originalx2, originy- originaly2, originx+ originalx3, originy- originaly3);

// Print menu

cout << "\nMenu:";

cout << "\n1. Translate Triangle";

cout << "\n2. Rotate Triangle";

cout << "\n3. Scale Triangle";

cout << "\n4. Exit";

cout << "\nEnter your choice: ";

cin >> choice;

switch (choice)

{

case 1:

cout << "\nEnter translation factors (tx, ty): ";

cin >> tx >> ty;

translateTriangle(x1, y1, x2, y2, x3, y3, tx, ty);

break;

case 2:

cout << "\nEnter rotation angle: ";

cin >> angle;

rotateTriangle(x1, y1, x2, y2, x3, y3, angle);

break;

case 3:

cout << "\nEnter scaling factors (sx, sy): ";

cin >> sx >> sy;

scaleTriangle(x1, y1, x2, y2, x3, y3, sx, sy);

break;

case 4:

// closegraph();

break;

// exit(0);

default:

cout << "\nInvalid choice!";

}

// Draw the transformed triangle in the respective quadrant

setcolor(YELLOW);

if (x1>=0)x1+=originx; else x1-=originx;

if (y1>=0)y1=originy-y1; else y1+=originy;

if (x2>=0)x2+=originx; else x2-=originx;

if (y2>=0)y2=originy-y2; else y2+=originy;

if (x3>=0)x3+=originx; else x3-=originx;

if (y3>=0)y3=originy-y3; else y3+=originy;

// if (x1 >= 0 && y1 >= 0)

drawTriangle(x1, y1, x2, y2, x3, y3);

// drawTriangle(originx + x1, originy - y1, originx + x2, originy - y2, originx + x3, originy - y3);

// else if (x1 < 0 && y1 >= 0)

// drawTriangle(originx + x1, originy - y1, originx + x2, originy - y2, originx + x3, originy - y3);

// // drawTriangle(x1 + getmaxx() / 2, y1, x2 + getmaxx() / 2, y2, x3 + getmaxx() / 2, y3);

// else if (x1 < 0 && y1 < 0)

// drawTriangle(x1 + getmaxx() / 2, y1 + getmaxy() / 2, x2 + getmaxx() / 2, y2 + getmaxy() / 2, x3 + getmaxx() / 2, y3 + getmaxy() / 2);

// else

// drawTriangle(x1, y1 + getmaxy() / 2, x2, y2 + getmaxy() / 2, x3, y3 + getmaxy() / 2);

delay(10000);

}

getch();

closegraph();

return 0;

}

**OUTPUT:-**

C:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode>"c:\Deepankar\06\_semester\TBC 601 Computer Graphics\PracticalsVScode\Home\build\13\_2Dtransformations.exe"

Menu:

1. Translate Triangle

2. Rotate Triangle

3. Scale Triangle

4. Exit

Enter your choice: 1

Enter translation factors (tx, ty): 30

20

Menu:

1. Translate Triangle

2. Rotate Triangle

3. Scale Triangle

4. Exit

Enter your choice: 2

Enter rotation angle: -45

Menu:

1. Translate Triangle

2. Rotate Triangle

3. Scale Triangle

4. Exit

Enter your choice: 2

Enter rotation angle: 30

Menu:

1. Translate Triangle

2. Rotate Triangle

3. Scale Triangle

4. Exit

Enter your choice: 3

Enter scaling factors (sx, sy): 3

4

Menu:

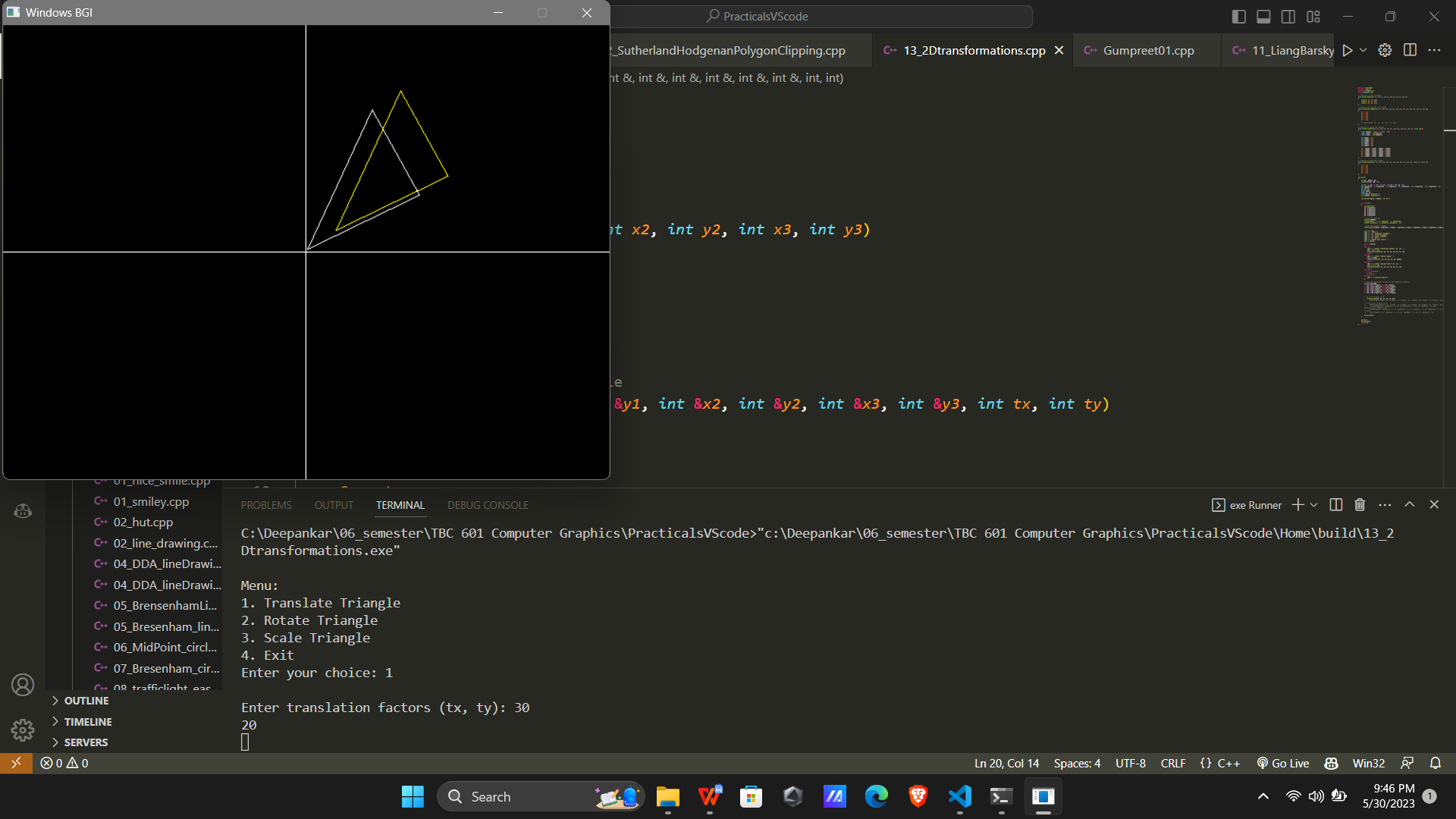
1. Translate Triangle

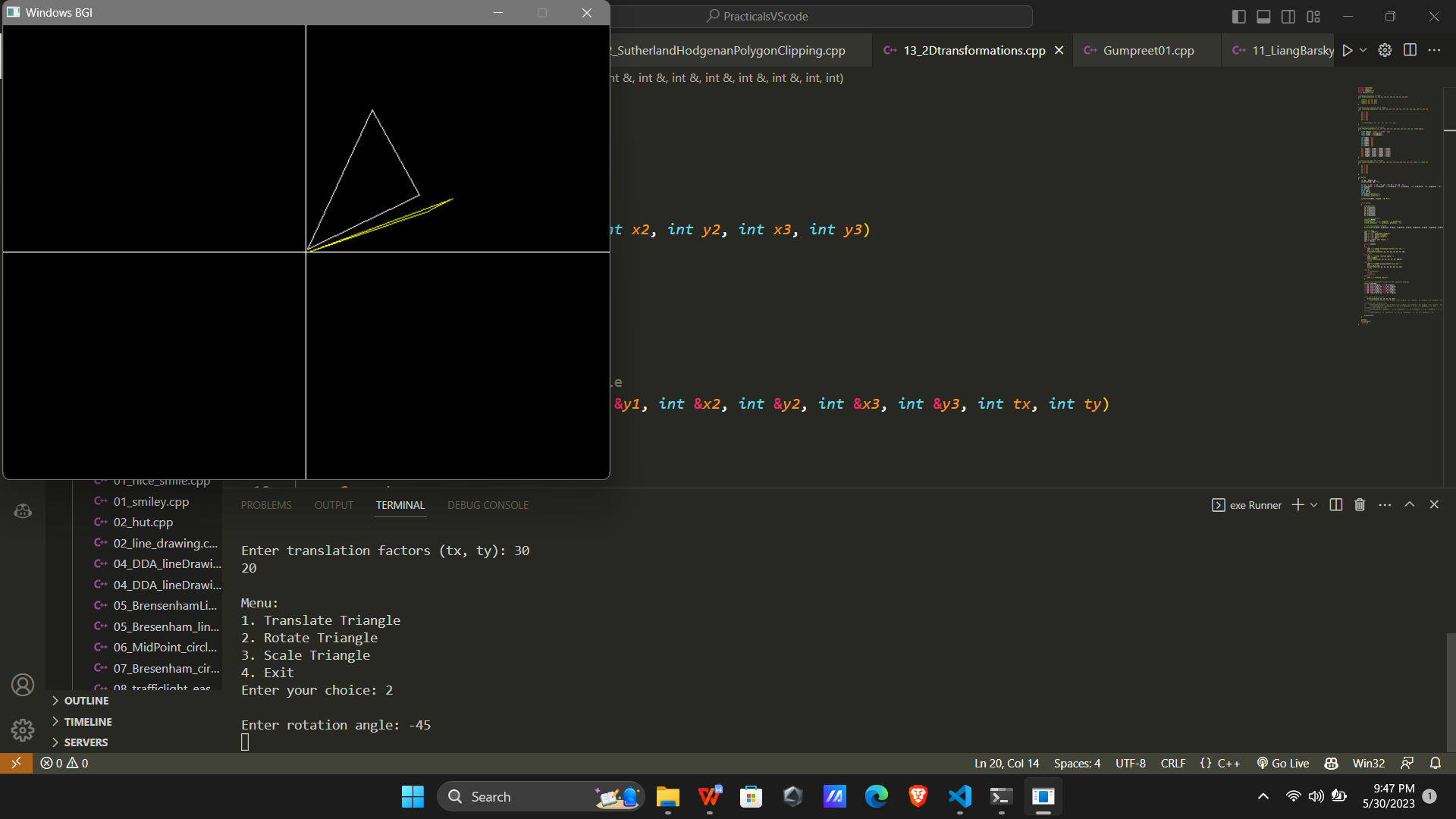
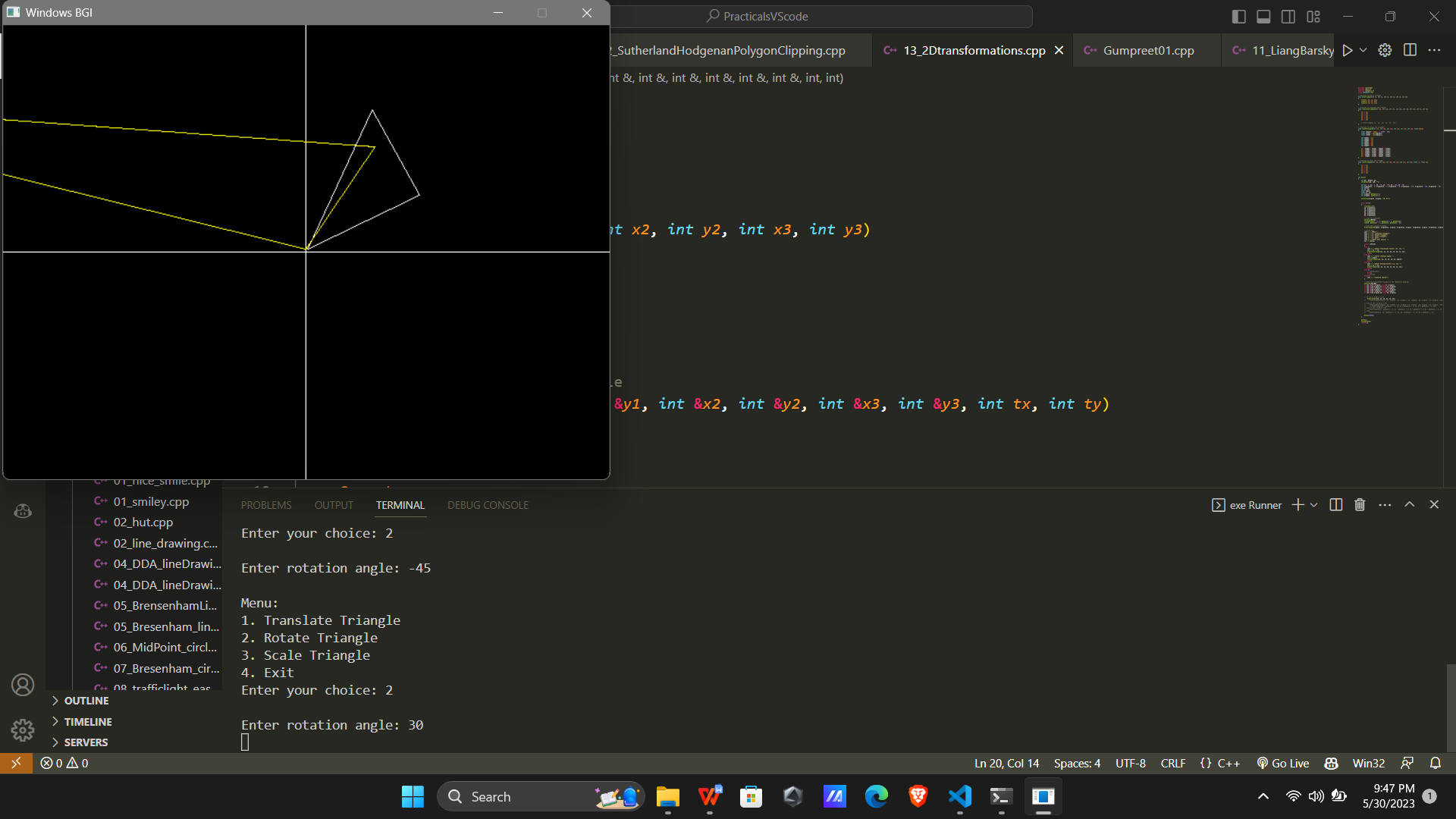
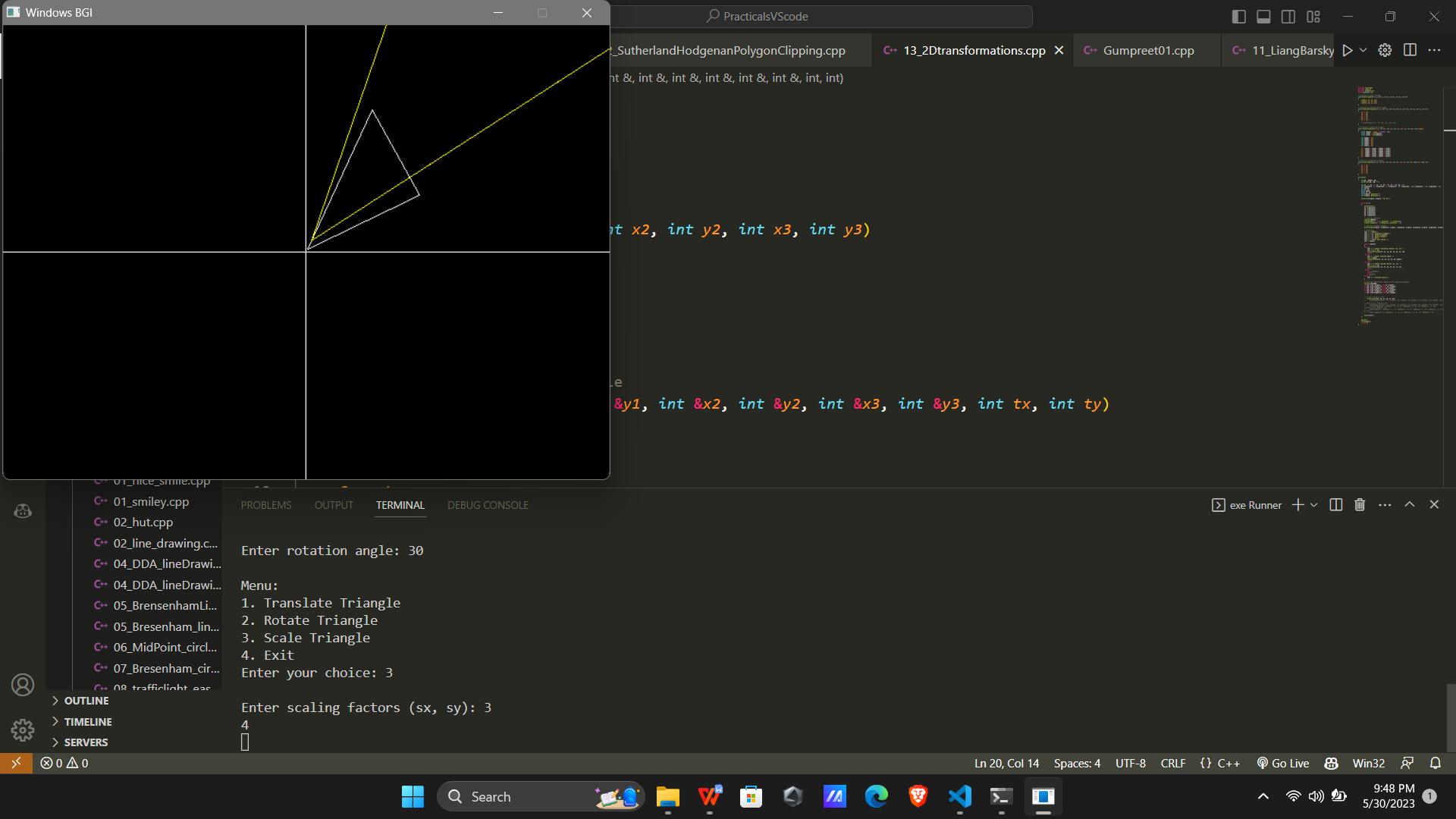
2. Rotate Triangle

3. Scale Triangle

4. Exit

Enter your choice: 4



**NAME- Deepankar Sharma**

**COURSE- BCA**

**ROLL NO- 2092014**

**SUBJECT- Computer graphics lab**

**PRACTICLE-13**

**OBJECTIVE- To implement Point Clipping through graphics.**

**SYNTAX:-**

**OUTPUT:-**