NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR

Cachar, Assam

B.Tech. VIth Sem

Subject Code: CS-317

Subject Name: Graphics and Multimedia Lab

Submitted By:

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Branch : CSE – B

1. **Rotation of a rectangle based on pivot points (20, 30).**
    a. **Translate object to origin from its original position as shown in fig (b).**
    b. **Rotate the object about the origin as shown in fig (c).**
    c. **Translate the object to its original position from origin. It is called as reverse translation as shown in fig (d).**

➔ **CODE:**

```
#include <iostream>
#include <iostream>
#include <GL/glut.h>
using namespace std;

GLfloat px, py, Rotation;
GLfloat ax, ay, bx, by, cx, cy, dx, dy;

void myinit (void) {
      glClear (GL_COLOR_BUFFER_BIT);
      glClearColor (0.0, 0.0, 0.0, 0.0);
      glMatrixMode (GL_PROJECTION);
      glLoadIdentity ();
      gluOrtho2D (-100, 100, -100, 100);
}

void drawRect () {
      glBegin (GL_LINE_LOOP);
            glVertex2f (ax, ay);
            glVertex2f (bx, by);
            glVertex2f (dx, dy);
            glVertex2f (cx, cy);
      glEnd ();
}

void drawQuadrants () {
      glPointSize (3.0);
      glColor3f (0.0f, 0.5f, 0.5f);

      glBegin (GL_LINE_LOOP);
      glVertex3f (-500.0, 0.0, 0.0);
      glVertex3f (500.0, 0.0, 0.0);
    glEnd ();

    glBegin (GL_LINE_LOOP);
      glVertex3f (0.0, -500.0, 0.0);
      glVertex3f (0.0, 500.0, 0.0);
    glEnd ();
}
```

```
void display () {
      drawQuadrants ();
      ax = 10.0, ay = 50.0;
      bx = 30.0, by = 50.0,
      cx = 10.0, cy = 15.0,
      dx = 30.0, dy = 15.0;
      px = 20.0, py = 30.0;

      glColor3f (1.0f, 1.0f, 1.0f);
      drawRect ();

      GLfloat midX, midY;
      midX = (ax + bx + cx + dx) / 4.0;
      midY = (ay + by + cy + dy) / 4.0;
      glColor3f (0.0f, 1.0f, 0.0f);
      glTranslatef (-midX, -midY, 0.0);
      glTranslatef (midX-px, midY-py, 0.0);
      drawRect ();

      Rotation = -90;
      glColor3f (1.0f, 0.0f, 0.0f);
      glTranslatef (px, py, 0.0f);
      glRotatef (Rotation, 0.0f, 0.0f, 1.0f);
      glTranslatef (-px, -py, 0.0f);
      drawRect ();

      glColor3f (0.0f, 0.0f, 1.0f);
      glTranslatef (px, py, 0.0f);
      glRotatef (-Rotation, 0.0f, 0.0f, 1.0f);
      glTranslatef (-px, -py, 0.0f);
      glTranslatef (px-midX, py-midY, 0.0);
      glTranslatef (midX, midY, 0.0);

      drawRect ();
      glFlush ();
}

int main (int argc, char **argv) {
      glutInit (&argc, argv);
    glutInitWindowSize (1000, 1000);
    glutInitWindowPosition (500, 0);
    glutInitDisplayMode (GLUT_SINGLE | GLUT_RGB);
    glutCreateWindow ("Rotation a rectangle based on pivot points");
      myinit ();
    glutDisplayFunc (display);
    glutMainLoop ();
    return 0;
}
```

OUTPUT:

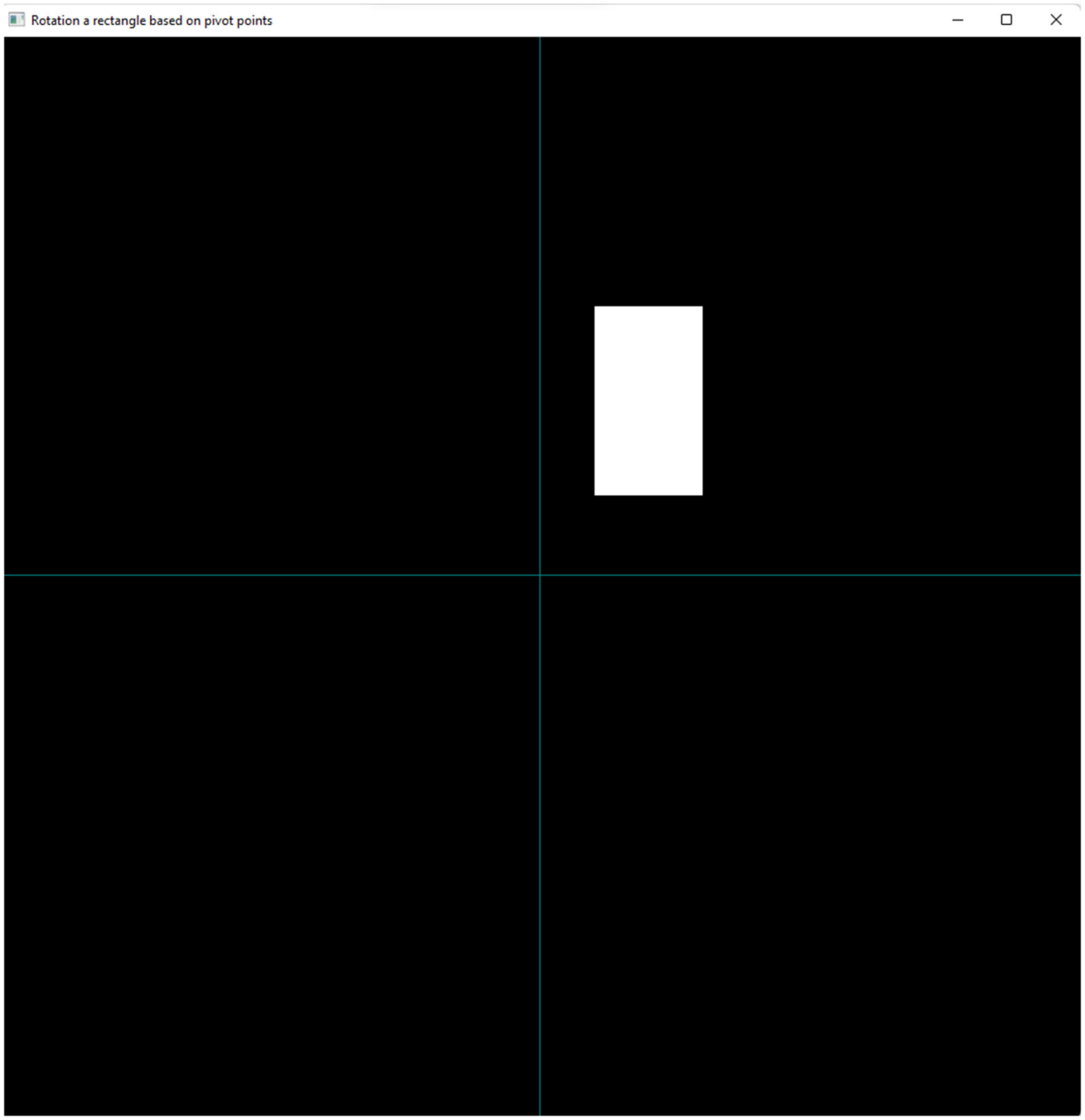

Fig.: Original Rectangle with pivot point (20, 30)

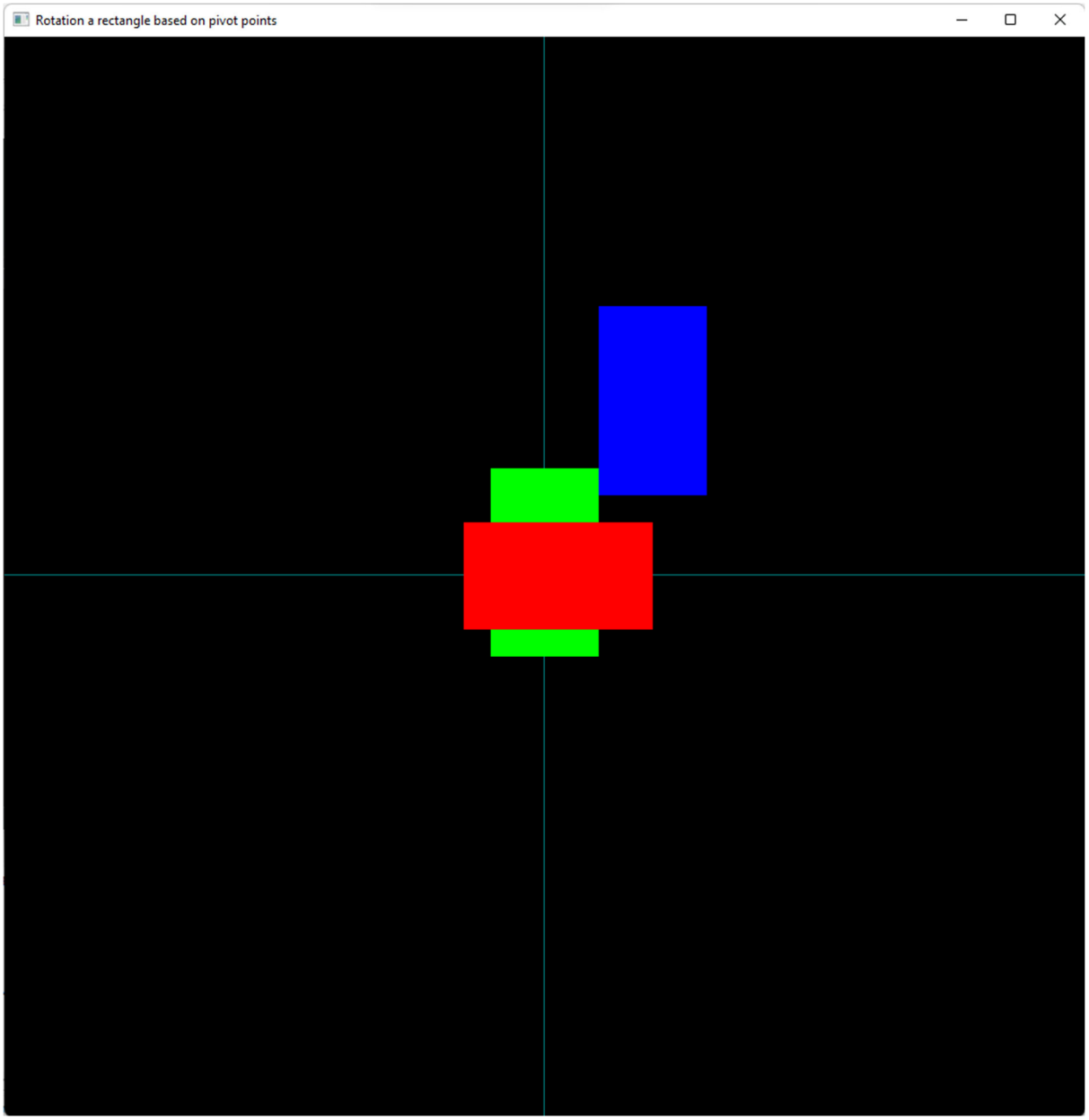

Fig.: **(a) Translated to origin from original point (Green Rectangle)**

(b) Rotated about origin (Red Rectangle)

(c) Reverse Translation. Translated back to its original position (Blue Rectangle)