Lab Exercise 10: Creating a 3D Scene in C++ using OpenGL

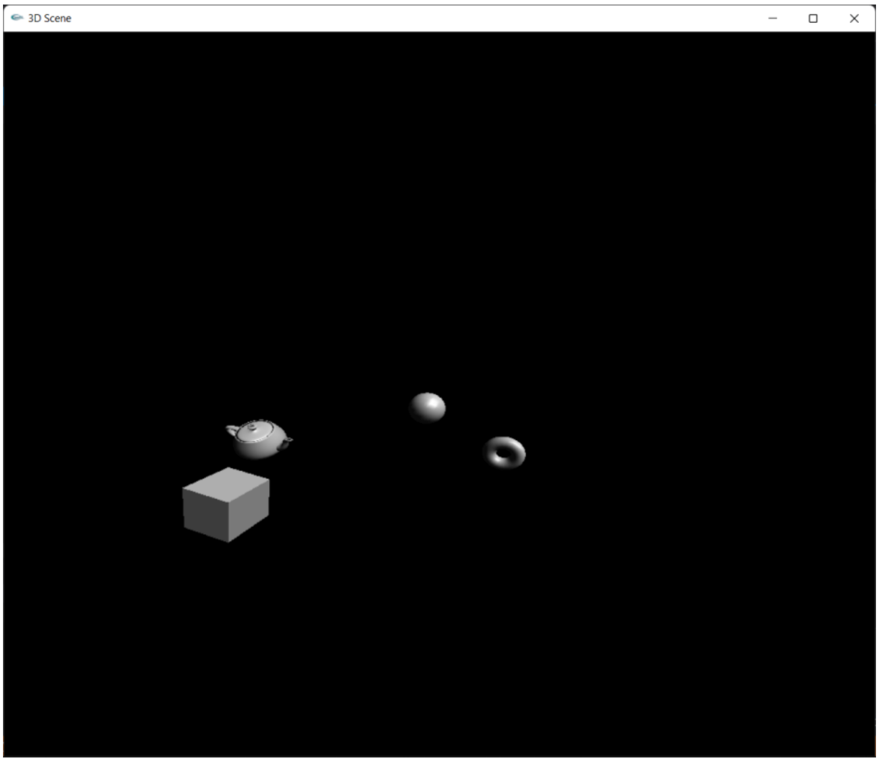
Write a C++ program using Opengl to draw atleast four 3D objects. Apply lighting and texture and render the scene. Apply transformations to create a simple 3D animation. [Use built-in transformation functions]

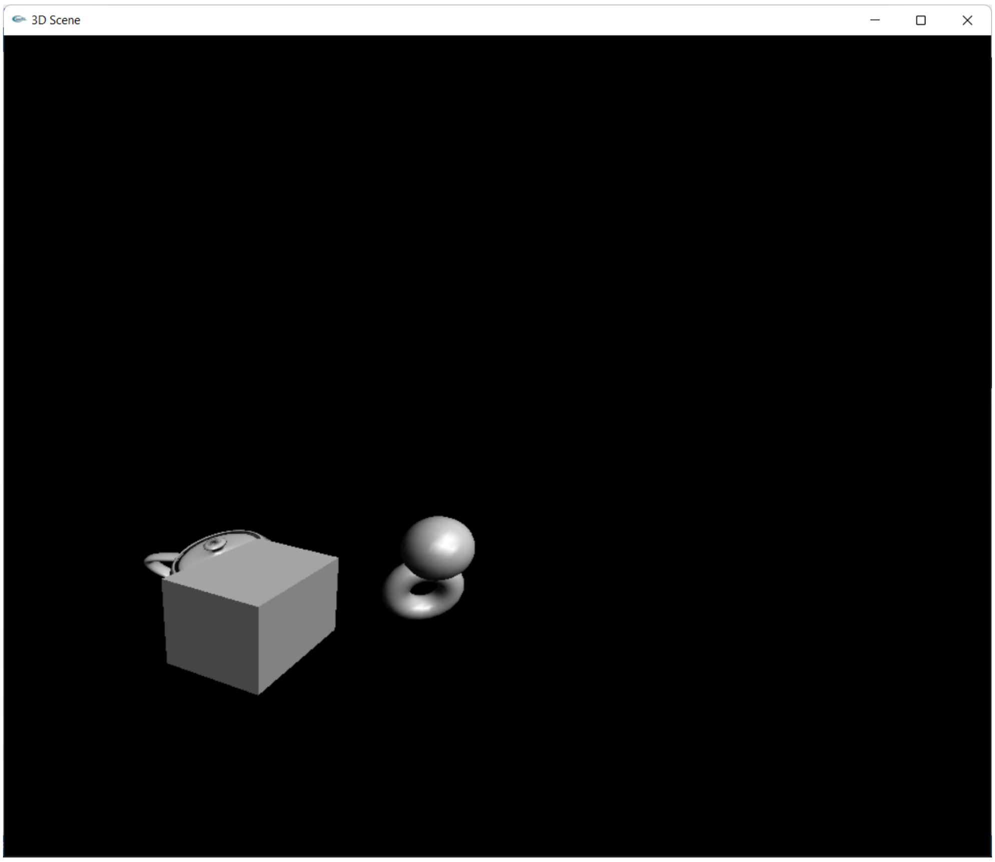
CODE:

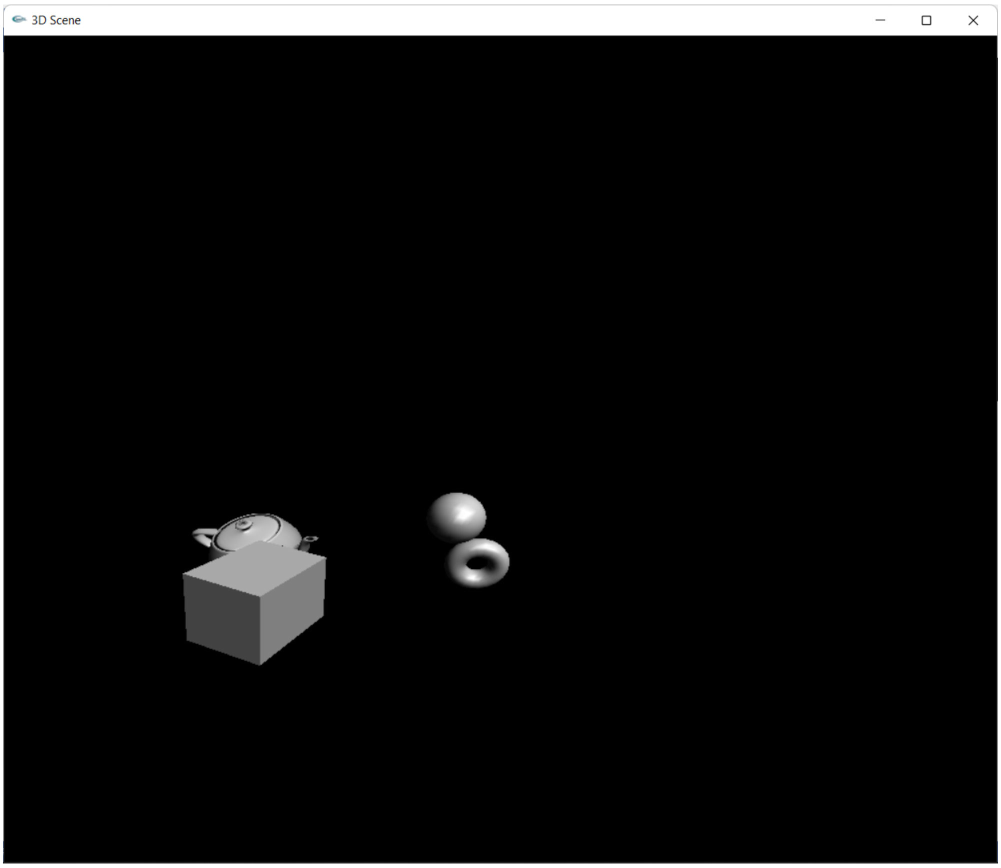
```
#include<gl/glut.h>
#include<iostream>
#include<vector>
using namespace std;

GLfloat alpha = 300, theta = 300, gamma = 300;
int index=0;
bool rev=false;
vector<vector<GLfloat>> coords(8, vector<GLfloat>(3));
GLfloat light_position[] = { 1.0, 1.0, 1.0, 0.0 };
void init(void)
{
	GLfloat mat_specular[] = { 1.0, 1.0, 1.0, 1.0 };
	GLfloat mat_shininess[] = { 50.0 };

	glClearColor(0.0, 0.0, 0.0, 0.0);
	glShadeModel(GL_SMOOTH);

	glMaterialfv(GL_FRONT, GL_SPECULAR, mat_specular);
	glMaterialfv(GL_FRONT, GL_SHININESS, mat_shininess);
	glLightfv(GL_LIGHT0, GL_POSITION, light_position);
	glEnable(GL_LIGHTING);
	glEnable(GL_LIGHT0);
	glEnable(GL_DEPTH_TEST);
}



void display(void)
{
	glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
	glMatrixMode(GL_PROJECTION);
	glLoadIdentity();
	gluPerspective(100, 1, 0.1, 10000);
	glMatrixMode(GL_MODELVIEW);
	glLoadIdentity();
	glRotatef(30, 0, 1, 0);
	gluLookAt(gamma, alpha, theta, -500, 0, -500, 0, 1, 0);
	glutSolidCube(100);
	gluLookAt(gamma, alpha, theta, 500, 0, -500, 0, 1, 0);
	glutSolidTeapot(100);
	gluLookAt(gamma, alpha, theta, -500, 0, 500, 0, 1, 0);
	glutSolidSphere(100,20,20);
	gluLookAt(gamma, alpha, theta, 500, 0, 500, 0, 1, 0);
	glutSolidTorus(50,100,20,20);
	gluLookAt(gamma, alpha, theta, 1000, 0, 0, 0, 1, 0);
	glFlush();
}

void timer(int v)
{
	if (!rev) {
```

```
            alpha += 1;
            theta += 1;
            gamma += 1;
            if (alpha == 500) rev = true;
        }
        else {
            alpha -= 1;
            theta -= 1;
            gamma -= 1;
            if (alpha == 200) rev = false;
        }
        glutPostRedisplay();
        glutTimerFunc(10, timer, v);
}
int main(int argc, char** argv)
{
        glutInit(&argc, argv);
        glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);
        glutInitWindowSize(1000, 1000);
        glutCreateWindow("3D Scene");
        init();
        glutDisplayFunc(display);
        glutTimerFunc(10,timer,0);
        glutMainLoop();

        return 0;
}
```

OUTPUT:




3D Scene


3D Scene