**Lab Taks-3**

Submission Guidelines-

* Rename the file with your serial number only
* Must submit within time that will be discussed in class in VUES
* Must include resources for all the section in the table

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| **Question- 1**  Draw five storied building with windows and a front door |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <windows.h>**  **#include <GL/glut.h>**  **#include <math.h>**  **void building()**  **{**  **// 1st floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .25, .25);**  **glVertex2f(5,10);**  **glVertex2f(5,14);**  **glVertex2f(-5,14);**  **glVertex2f(-5,10);**  **glEnd();**  **//2nd floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .35, .35);**  **glVertex2f(5,14);**  **glVertex2f(5,18);**  **glVertex2f(-5,18);**  **glVertex2f(-5,14);**  **glEnd();**  **// 3rd floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .5, .5);**  **glVertex2f(5,18);**  **glVertex2f(5,22);**  **glVertex2f(-5,22);**  **glVertex2f(-5,18);**  **glEnd();**  **//4th floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.99, .65, .63);**  **glVertex2f(5,22);**  **glVertex2f(5,26);**  **glVertex2f(-5,26);**  **glVertex2f(-5,22);**  **glEnd();**  **// 5th floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .7, .7);**  **glVertex2f(5,26);**  **glVertex2f(5,30);**  **glVertex2f(-5,30);**  **glVertex2f(-5,26);**  **glEnd();**  **glFlush();**  **}**  **void window()**  **{**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(-3,15);**  **glVertex2f(-4,15);**  **glVertex2f(-4,16);**  **glVertex2f(-3,16);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(3,15);**  **glVertex2f(4,15);**  **glVertex2f(4,16);**  **glVertex2f(3,16);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(-3,19);**  **glVertex2f(-4,19);**  **glVertex2f(-4,20);**  **glVertex2f(-3,20);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(3,19);**  **glVertex2f(4,19);**  **glVertex2f(4,20);**  **glVertex2f(3,20);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(-3,23);**  **glVertex2f(-4,23);**  **glVertex2f(-4,24);**  **glVertex2f(-3,24);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(3,23);**  **glVertex2f(4,23);**  **glVertex2f(4,24);**  **glVertex2f(3,24);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(-3,27);**  **glVertex2f(-4,27);**  **glVertex2f(-4,28);**  **glVertex2f(-3,28);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(3,27);**  **glVertex2f(4,27);**  **glVertex2f(4,28);**  **glVertex2f(3,28);**  **glEnd();**  **//door**  **glBegin(GL\_POLYGON);**  **glColor3ub(300, 200, 100);**  **glVertex2f(2,10);**  **glVertex2f(2,12);**  **glVertex2f(-2,12);**  **glVertex2f(-2,10);**  **glEnd();**  **glFlush();**  **}**  **void display()**  **{**  **glClearColor(1.0f, 1.0f, 1.0f, 1.0f);**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **//building**  **building();**  **//window**  **window();**  **}**  **int main(int argc, char\*\* argv)**  **{**  **glutInit(&argc, argv);**  **glutInitWindowSize(1200,1000);**  **glutCreateWindow("BUILDING");**  **glutDisplayFunc(display);**  **gluOrtho2D(-30,30,-35,35);**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 2**  Draw a tree |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <windows.h>**  **#include <GL/glut.h>**  **#include <math.h>**  **void circle(float radius, float cX, float cY)**  **{**  **glBegin(GL\_POLYGON);// Draw a Red 1x1 Square centered at origin**  **for(int i=0; i<200; i++)**  **{**  **glColor3f(0.77,.95,0.560);**  **float pi=3.1416;**  **float A=(i\*2\*pi)/200;**  **float r=radius;**  **float x = r \* cos(A);**  **float y = r \* sin(A);**  **glVertex2f(x+cX,y+cY);**  **}**  **}**  **void display()**  **{**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **glBegin(GL\_POLYGON);**  **glColor3f(1, 1, 1);**  **glVertex2f(30.0, -35.0);**  **glVertex2f(30, 35.0);**  **glVertex2f(-30, 35.0);**  **glVertex2f(-30.0, -35.0);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.58, .50, .460);**  **glVertex2f(-10.0, -6.0);**  **glVertex2f(-11, 5.0);**  **glVertex2f(-13, 5.0);**  **glVertex2f(-14.0, -6.0);**  **glEnd();**  **circle(4,-9,7);**  **circle(4,-15,7);**  **circle(4,-12,9);**  **glEnd();**  **glFlush();**  **}**  **int main(int argc, char\*\* argv)**  **{**  **glutInit(&argc, argv);**  **glutInitWindowSize(1200,1000);**  **glutCreateWindow(" TREE");**  **glutDisplayFunc(display);**  **gluOrtho2D(-25,25,-35,35);**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 3**  Draw a lamppost with black background |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <GL/glut.h>**  **#include <math.h>**  **// Function to draw a circle**  **void circle1(float radius, float cX, float cY) {**  **glBegin(GL\_POLYGON);**  **for (int i = 0; i < 200; i++) {**  **float pi = 3.1416;**  **float angle = (i \* 2 \* pi) / 200;**  **float x = radius \* cos(angle);**  **float y = radius \* sin(angle);**  **glVertex2f(x + cX, y + cY);**  **}**  **glEnd();**  **}**  **void display() {**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **// Drawing a lamp**  **glBegin(GL\_POLYGON);**  **glColor3f(0.94, 0.66, 0.74);**  **glVertex2f(18, -6.0);**  **glVertex2f(17, 12.0);**  **glVertex2f(16, 12.0);**  **glVertex2f(15.0, -6.0);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(17, 11);**  **glVertex2f(20, 13);**  **glVertex2f(20, 14);**  **glVertex2f(17, 12);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(16, 11);**  **glVertex2f(13, 13);**  **glVertex2f(13, 14);**  **glVertex2f(16, 12);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(13, 13);**  **glVertex2f(13, 16);**  **glVertex2f(14, 16);**  **glVertex2f(14, 13);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(20, 13);**  **glVertex2f(20, 16);**  **glVertex2f(19, 16);**  **glVertex2f(19, 13);**  **glEnd();**  **// Drawing circles**  **glColor3f(0.98, 0.98, 0.255); // Circle color**  **circle1(2, 13.5, 18);**  **circle1(2, 19.5, 18);**  **circle1(1, 16.5, 15);**  **glFlush();**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);**  **glutInitWindowSize(1200, 1000);**  **glutCreateWindow("LAMP");**  **gluOrtho2D(-30, 30, -30, 30);**  **glutDisplayFunc(display);**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 4**  Draw a bench |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <windows.h>**  **#include <GL/glut.h>**  **#include <math.h>**  **void display() {**  **glBegin(GL\_POLYGON);**  **glColor3f(1, 1, 1);**  **glVertex2f(30.0, -35.0);**  **glVertex2f(30, 35.0);**  **glVertex2f(-30, 35.0);**  **glVertex2f(-30.0, -35.0);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.41, .37, .33);**  **glVertex2f(6, -6);**  **glVertex2f(4, -2);**  **glVertex2f(-3, -2.0);**  **glVertex2f(-4.0, -6.0);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.41, .37, .33);**  **glVertex2f(5, -9);**  **glVertex2f(5, -6);**  **glVertex2f(4, -6);**  **glVertex2f(4.0, -9);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.41, .37, .33);**  **glVertex2f(-3, -9);**  **glVertex2f(-3, -6);**  **glVertex2f(-2, -6);**  **glVertex2f(-2.0, -9);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.85, .77, .67);**  **glVertex2f(3, -7);**  **glVertex2f(3, -4);**  **glVertex2f(2, -4);**  **glVertex2f(2.0, -7);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.85, .77, .67);**  **glVertex2f(-0, -7);**  **glVertex2f(-0, -4);**  **glVertex2f(-1, -4);**  **glVertex2f(-1.0, -7);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.41, .37, .33);**  **glVertex2f(6, -6);**  **glVertex2f(4, -2);**  **glVertex2f(-3, -2.0);**  **glVertex2f(-4.0, -6.0);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3f(.85, .77, .67);**  **glVertex2f(4, -1.9);**  **glVertex2f(4, 1.9);**  **glVertex2f(-3, 1.90);**  **glVertex2f(-3.0, -1.9);**  **glEnd();**  **glFlush();**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitWindowSize(1200,1000);**  **glutCreateWindow("BENCH");**  **glutDisplayFunc(display);**  **gluOrtho2D(-30,30,-30,30);**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 5**  Use the building, tree, lamppost and bench to create a scenario |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <windows.h>**  **#include <GL/glut.h>**  **#include <math.h>**  **// Circle drawing function**  **void circle(float radius, float cX, float cY) {**  **glBegin(GL\_POLYGON);**  **for (int i = 0; i < 200; i++) {**  **float pi = 3.1416;**  **float angle = (i \* 2 \* pi) / 200;**  **float x = radius \* cos(angle);**  **float y = radius \* sin(angle);**  **glVertex2f(x + cX, y + cY);**  **}**  **glEnd();**  **}**  **// Building**  **void building() {**  **// 1st floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .25, .25);**  **glVertex2f(5, 10);**  **glVertex2f(5, 14);**  **glVertex2f(-5, 14);**  **glVertex2f(-5, 10);**  **glEnd();**  **// 2nd floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .35, .35);**  **glVertex2f(5, 14);**  **glVertex2f(5, 18);**  **glVertex2f(-5, 18);**  **glVertex2f(-5, 14);**  **glEnd();**  **// 3rd floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .5, .5);**  **glVertex2f(5, 18);**  **glVertex2f(5, 22);**  **glVertex2f(-5, 22);**  **glVertex2f(-5, 18);**  **glEnd();**  **// 4th floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.99, .65, .63);**  **glVertex2f(5, 22);**  **glVertex2f(5, 26);**  **glVertex2f(-5, 26);**  **glVertex2f(-5, 22);**  **glEnd();**  **// 5th floor**  **glBegin(GL\_POLYGON);**  **glColor3f(.98, .7, .7);**  **glVertex2f(5, 26);**  **glVertex2f(5, 30);**  **glVertex2f(-5, 30);**  **glVertex2f(-5, 26);**  **glEnd();**  **glFlush();**  **}**  **// Windows and door**  **void window() {**  **// Windows on each floor**  **for (int y = 15; y <= 27; y += 4) {**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(-3, y);**  **glVertex2f(-4, y);**  **glVertex2f(-4, y + 1);**  **glVertex2f(-3, y + 1);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glColor3ub(100, 200, 300);**  **glVertex2f(3, y);**  **glVertex2f(4, y);**  **glVertex2f(4, y + 1);**  **glVertex2f(3, y + 1);**  **glEnd();**  **}**  **// Door**  **glBegin(GL\_POLYGON);**  **glColor3ub(300, 200, 100);**  **glVertex2f(2, 10);**  **glVertex2f(2, 12);**  **glVertex2f(-2, 12);**  **glVertex2f(-2, 10);**  **glEnd();**  **glFlush();**  **}**  **// Tree**  **void tree() {**  **glBegin(GL\_POLYGON);**  **glColor3f(.58, .50, .460);**  **glVertex2f(-10.0, -6.0);**  **glVertex2f(-11, 5.0);**  **glVertex2f(-13, 5.0);**  **glVertex2f(-14.0, -6.0);**  **glEnd();**  **// Leaves**  **glColor3f(0.77, .95, 0.560); // Restored tree leaves color**  **circle(4, -9, 7);**  **circle(4, -15, 7);**  **circle(4, -12, 9);**  **glFlush();**  **}**  **// Lamp post**  **void lampPost() {**  **// Post body**  **glBegin(GL\_POLYGON);**  **glColor3f(0.94, 0.66, 0.74); // Lamp post color**  **glVertex2f(18, -6.0);**  **glVertex2f(17, 12.0);**  **glVertex2f(16, 12.0);**  **glVertex2f(15.0, -6.0);**  **glEnd();**  **// Horizontal arms**  **glBegin(GL\_POLYGON);**  **glColor3f(0.94, 0.66, 0.74); // Lamp arm color**  **glVertex2f(17, 11);**  **glVertex2f(20, 13);**  **glVertex2f(20, 14);**  **glVertex2f(17, 12);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(16, 11);**  **glVertex2f(13, 13);**  **glVertex2f(13, 14);**  **glVertex2f(16, 12);**  **glEnd();**  **// Vertical poles for lamps**  **glBegin(GL\_POLYGON);**  **glVertex2f(13, 13);**  **glVertex2f(13, 16);**  **glVertex2f(14, 16);**  **glVertex2f(14, 13);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(20, 13);**  **glVertex2f(20, 16);**  **glVertex2f(19, 16);**  **glVertex2f(19, 13);**  **glEnd();**  **// Lamp bulbs**  **glColor3f(0.98, 0.98, 0.255); // Bulb color**  **circle(2, 13.5, 18); // Left bulb**  **circle(2, 19.5, 18); // Right bulb**  **circle(1, 16.5, 15); // Center bulb**  **}**  **// Bench**  **void bench() {**  **// Seat and legs**  **glBegin(GL\_POLYGON);**  **glColor3f(0.5, 0.25, 0.0);**  **glVertex2f(-20, -10);**  **glVertex2f(-10, -10);**  **glVertex2f(-10, -8);**  **glVertex2f(-20, -8);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(-19, -10);**  **glVertex2f(-19, -12);**  **glVertex2f(-18, -12);**  **glVertex2f(-18, -10);**  **glEnd();**  **glBegin(GL\_POLYGON);**  **glVertex2f(-12, -10);**  **glVertex2f(-12, -12);**  **glVertex2f(-11, -12);**  **glVertex2f(-11, -10);**  **glEnd();**  **glFlush();**  **}**  **// Display function**  **void display() {**  **glClearColor(1.0f, 1.0f, 1.0f, 1.0f);**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **building();**  **window();**  **tree();**  **lampPost();**  **bench();**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitWindowSize(1200, 1000);**  **glutCreateWindow("Building, Tree, Lamp Post, and Bench");**  **glutDisplayFunc(display);**  **gluOrtho2D(-30, 30, -35, 35);**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |