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| **Question- 1**  Draw five storied building with windows and a front door |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <GL/glut.h>s**  **#include<cmath>**  **void drawbuilding() {**  **glColor3f(0.0, 0.6, 1); //main building**  **glBegin(GL\_QUADS);**  **glVertex2f(30,10);**  **glVertex2f(55,10);**  **glVertex2f(55,60);**  **glVertex2f(30,60);**  **glEnd();**  **glColor3f(0.2, 0.5, 0.4); //door**  **glBegin(GL\_QUADS);**  **glVertex2f(40,10);**  **glVertex2f(45,10);**  **glVertex2f(45,15);**  **glVertex2f(40,15);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0); //window**  **glBegin(GL\_QUADS);**  **glVertex2f(34,22);**  **glVertex2f(38,22);**  **glVertex2f(38,26);**  **glVertex2f(34,26);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(34,32);**  **glVertex2f(38,32);**  **glVertex2f(38,36);**  **glVertex2f(34,36);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(34,42);**  **glVertex2f(38,42);**  **glVertex2f(38,46);**  **glVertex2f(34,46);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(34,52);**  **glVertex2f(38,52);**  **glVertex2f(38,56);**  **glVertex2f(34,56);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(47,22);**  **glVertex2f(51,22);**  **glVertex2f(51,26);**  **glVertex2f(47,26);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(47,32);**  **glVertex2f(51,32);**  **glVertex2f(51,36);**  **glVertex2f(47,36);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(47,42);**  **glVertex2f(51,42);**  **glVertex2f(51,46);**  **glVertex2f(47,46);**  **glEnd();**  **glColor3f(1.0, 0.2, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(47,52);**  **glVertex2f(51,52);**  **glVertex2f(51,56);**  **glVertex2f(47,56);**  **glEnd();**  **}**  **void drawLines()**  **{**  **glColor3f(0.0, 0.0, 0.0);**  **glBegin(GL\_LINE\_LOOP);**  **glVertex2f(30,20);**  **glVertex2f(55,20);**  **glEnd();**  **glColor3f(0.0, 0.0, 0.0);**  **glBegin(GL\_LINE\_LOOP);**  **glVertex2f(30,30);**  **glVertex2f(55,30);**  **glEnd();**  **glColor3f(0.0, 0.0, 0.0);**  **glBegin(GL\_LINE\_LOOP);**  **glVertex2f(30,40);**  **glVertex2f(55,40);**  **glEnd();**  **glBegin(GL\_LINE\_LOOP);**  **glVertex2f(30,50);**  **glVertex2f(55,50);**  **glEnd();**  **}**  **void display() {**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **glColor4f(1.0,1.0,1.0,0.0);**  **drawbuilding();**  **//drawTree();**  **drawLines();**  **//drawlamp();**  **//drawbench();**  **glFlush();**  **}**  **void init() {**  **glClearColor(1.0, 1.0, 1.0, 0.0);**  **glMatrixMode(GL\_PROJECTION);**  **glLoadIdentity();**  **gluOrtho2D(0.0, 90.0, 0.0, 70.0);**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);**  **glutInitWindowSize(840, 680);**  **glutCreateWindow("Scenario");**  **glutDisplayFunc(display);**  **init();**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 2**  Draw a tree |
| **Graph Plot (Picture)-** |
| **Code-**  **#include <GL/glut.h>s**  **#include<cmath>**  **void drawTree() {**  **glColor3f(0.4, 0.2, 0.0); // Brown color**  **glBegin(GL\_QUADS);**  **glVertex2f(35,30);**  **glVertex2f(40, 30);**  **glVertex2f(40, 40);**  **glVertex2f(35,40);**  **glEnd();**  **// Draw the tree leaves (circular)**  **glColor3f(0.0, 0.6, 0.0); // Green color**  **int numSegments = 40; // Number of segments for the circle**  **GLfloat radius = 6; // Radius of the circle**  **glBegin(GL\_TRIANGLE\_FAN);**  **glVertex2f(37.5,45); // Center of the circle**  **for (int i = 0; i <= numSegments; i++) {**  **float theta = 2.0f \* M\_PI \* float(i) / float(numSegments);**  **float x = radius \* cosf(theta);**  **float y = radius \* sinf(theta);**  **glVertex2f(37.5 + x,45 + y);**  **}**  **glEnd();**  **}**  **void display() {**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **glColor4f(1.0,1.0,1.0,0.0);**  **// drawbuilding();**  **drawTree();**  **//drawLines();**  **//drawlamp();**  **//drawbench();**  **glFlush();**  **}**  **void init() {**  **glClearColor(0.0, 0.0, 0.0, 0.0);**  **glMatrixMode(GL\_PROJECTION);**  **glLoadIdentity();**  **gluOrtho2D(0.0, 90.0, 0.0, 70.0);**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);**  **glutInitWindowSize(840, 680);**  **glutCreateWindow("Scenario");**  **glutDisplayFunc(display);**  **init();**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 3**  Draw a lamppost with black background |
| **Graph Plot (Picture)-**  Image |
| **Code-**  **#include <GL/glut.h>s**  **#include<cmath>**  **void drawlamp()**  **{**  **glColor3f(0.2, 0.4, 0.0);//lamp**  **glBegin(GL\_QUADS);**  **glVertex2f(45,10);**  **glVertex2f(55,10);**  **glVertex2f(55,13);**  **glVertex2f(45,13);**  **glEnd();**  **glColor3f(0.2 ,0.4, 0.0);**  **glBegin(GL\_QUADS);**  **glVertex2f(48.5,13);**  **glVertex2f(51.5,13);**  **glVertex2f(51.5,43);**  **glVertex2f(48.5,43);**  **glEnd();**  **glColor3f(1.0, 1.0, 0.0); // yellow**  **int numSegments = 50; // Number of segments for the circle**  **GLfloat radius =3; // Radius of the circle**  **glBegin(GL\_TRIANGLE\_FAN);**  **glVertex2f(50,45); // Center of the circle**  **for (int i = 0; i <= numSegments; i++) {**  **float theta = 2.0f \* M\_PI \* float(i) / float(numSegments);**  **float x = radius \* cosf(theta);**  **float y = radius \* sinf(theta);**  **glVertex2f(50 + x, 45 + y);**  **}**  **glEnd();**  **}**  **void display() {**  **glClear(GL\_COLOR\_BUFFER\_BIT);**  **glColor4f(1.0,1.0,1.0,0.0);**  **// drawbuilding();**  **// drawTree();**  **//drawLines();**  **drawlamp();**  **//drawbench();**  **glFlush();**  **}**  **void init() {**  **glClearColor(0.0, 0.0, 0.0, 0.0);**  **glMatrixMode(GL\_PROJECTION);**  **glLoadIdentity();**  **gluOrtho2D(0.0, 90.0, 0.0, 70.0);**  **}**  **int main(int argc, char\*\* argv) {**  **glutInit(&argc, argv);**  **glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);**  **glutInitWindowSize(840, 680);**  **glutCreateWindow("Scenario");**  **glutDisplayFunc(display);**  **init();**  **glutMainLoop();**  **return 0;**  **}** |
| **Output Screenshot (Full Screen)-** |

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| **Question- 4**  Draw a bench |
| **Graph Plot (Picture)-** |
| **Code-**  #include <GL/glut.h>s  #include<cmath>  void drawbench()  {  glColor3f(0.8, 0.6, 0.4);  glBegin(GL\_QUADS);  glVertex2f(20,40);  glVertex2f(40,40);  glVertex2f(40,47);  glVertex2f(20,47);  glEnd();  glColor3f(0.8, 0.6, 0.4);  glBegin(GL\_QUADS);  glVertex2f(20,35);  glVertex2f(40,35);  glVertex2f(40,37);  glVertex2f(20,37);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(21,37);  glVertex2f(22,37);  glVertex2f(22,40);  glVertex2f(21,40);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(38,37);  glVertex2f(39,37);  glVertex2f(39,40);  glVertex2f(38,40);  glEnd();  //  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(20,27);  glVertex2f(22,27.5);  glVertex2f(22,35);  glVertex2f(20,35);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(38,27.5);  glVertex2f(40,27);  glVertex2f(40,35);  glVertex2f(38,35);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(22.5,31);  glVertex2f(23.5,31);  glVertex2f(23.5,35);  glVertex2f(22.5,35);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(36.5,31);  glVertex2f(37.5,31);  glVertex2f(37.5,35);  glVertex2f(36.5,35);  glEnd();  }  void display() {  glClear(GL\_COLOR\_BUFFER\_BIT);  glColor4f(1.0,1.0,1.0,0.0);  // drawbuilding();  // drawTree();  //drawLines();  // drawlamp();  drawbench();  glFlush();  }  void init() {  glClearColor(1.0, 1.0, 1.0, 0.0);  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  gluOrtho2D(0.0, 100.0, 0.0, 100.0);  }  int main(int argc, char\*\* argv) {  glutInit(&argc, argv);  glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);  glutInitWindowSize(840, 680);  glutCreateWindow("Scenario");  glutDisplayFunc(display);  init();  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 <GL/glut.h>s  #include<cmath>  void drawbuilding() {  glColor3f(0.0, 0.6, 1); //main building  glBegin(GL\_QUADS);  glVertex2f(30,10);  glVertex2f(55,10);  glVertex2f(55,60);  glVertex2f(30,60);  glEnd();  glColor3f(0.2, 0.5, 0.4); //door  glBegin(GL\_QUADS);  glVertex2f(40,10);  glVertex2f(45,10);  glVertex2f(45,15);  glVertex2f(40,15);  glEnd();  glColor3f(1.0, 0.2, 0.0); //janala  glBegin(GL\_QUADS);  glVertex2f(34,22);  glVertex2f(38,22);  glVertex2f(38,26);  glVertex2f(34,26);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(34,32);  glVertex2f(38,32);  glVertex2f(38,36);  glVertex2f(34,36);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(34,42);  glVertex2f(38,42);  glVertex2f(38,46);  glVertex2f(34,46);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(34,52);  glVertex2f(38,52);  glVertex2f(38,56);  glVertex2f(34,56);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(47,22);  glVertex2f(51,22);  glVertex2f(51,26);  glVertex2f(47,26);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(47,32);  glVertex2f(51,32);  glVertex2f(51,36);  glVertex2f(47,36);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(47,42);  glVertex2f(51,42);  glVertex2f(51,46);  glVertex2f(47,46);  glEnd();  glColor3f(1.0, 0.2, 0.0);  glBegin(GL\_QUADS);  glVertex2f(47,52);  glVertex2f(51,52);  glVertex2f(51,56);  glVertex2f(47,56);  glEnd();  }  void drawLines()  {  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_LINE\_LOOP);  glVertex2f(30,20);  glVertex2f(55,20s );  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_LINE\_LOOP);  glVertex2f(30,30);  glVertex2f(55,30);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_LINE\_LOOP);  glVertex2f(30,40);  glVertex2f(55,40);  glEnd();  glBegin(GL\_LINE\_LOOP);  glVertex2f(30,50);  glVertex2f(55,50);  glEnd();  }  void drawTree() {  // Draw the tree trunk  glColor3f(0.4, 0.2, 0.0); // Brown color  glBegin(GL\_QUADS);  glVertex2f(15,10);  glVertex2f(20, 10);  glVertex2f(20,20);  glVertex2f(15,20);  glEnd();  // Draw the tree leaves (circular)  glColor3f(0.0, 0.6, 0.0); // Green color  int numSegments = 20; // Number of segments for the circle  GLfloat radius = 6; // Radius of the circle  glBegin(GL\_TRIANGLE\_FAN);  glVertex2f(17.5,25); // Center of the circle  for (int i = 0; i <= numSegments; i++) {  float theta = 2.0f \* M\_PI \* float(i) / float(numSegments);  float x = radius \* cosf(theta);  float y = radius \* sinf(theta);  glVertex2f(17.5 + x, 20 + y);  }  glEnd();  }  void drawlamp()  {  glColor3f(0.0, 0.0, 0.0);//lamp  glBegin(GL\_QUADS);  glVertex2f(60,10);  glVertex2f(63,10);  glVertex2f(63,11);  glVertex2f(60,11);  glEnd();  glColor3f(0.0 ,0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(61,11);  glVertex2f(62,11);  glVertex2f(62,20);  glVertex2f(61,20);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(60,10);  glVertex2f(63,10);  glVertex2f(63,11);  glVertex2f(60,11);  glEnd();  glColor3f(1.0, 1.0, 0.0); // Green color  int numSegments = 20; // Number of segments for the circle  GLfloat radius =1; // Radius of the circle  glBegin(GL\_TRIANGLE\_FAN);  glVertex2f(61.5,21); // Center of the circle  for (int i = 0; i <= numSegments; i++) {  float theta = 2.0f \* M\_PI \* float(i) / float(numSegments);  float x = radius \* cosf(theta);  float y = radius \* sinf(theta);  glVertex2f(61.5 + x, 21 + y);  }  glEnd();  }  void drawbench()  {  glColor3f(0.8, 0.6, 0.4);  glBegin(GL\_QUADS);  glVertex2f(70,16);  glVertex2f(80,16);  glVertex2f(80,18);  glVertex2f(70,18);  glEnd();  glColor3f(0.8, 0.6, 0.4);  glBegin(GL\_QUADS);  glVertex2f(70,14);  glVertex2f(80,14);  glVertex2f(80,15);  glVertex2f(70,15);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(71,15);  glVertex2f(72,15);  glVertex2f(72,16);  glVertex2f(71,16);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(78,15);  glVertex2f(79,15);  glVertex2f(79,16);  glVertex2f(78,16);  glEnd();  //  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(70,10);  glVertex2f(71,10.5);  glVertex2f(71,14);  glVertex2f(70,14);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(79,10.5);  glVertex2f(80,10);  glVertex2f(80,14);  glVertex2f(79,14);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(71.5,11);  glVertex2f(72,11);  glVertex2f(72,14);  glVertex2f(71.5,14);  glEnd();  glColor3f(0.0, 0.0, 0.0);  glBegin(GL\_QUADS);  glVertex2f(78,11);  glVertex2f(78.5,11);  glVertex2f(78.5,14);  glVertex2f(78,14);  glEnd();  }  void display() {  glClear(GL\_COLOR\_BUFFER\_BIT);  glColor4f(1.0,1.0,1.0,0.0);  // drawArrow();  //drawAxes();  // drawdoor();  drawbuilding();  drawTree();  // drawRectangle();  // drawPurpleTriangle();  //drawYellowTriangle();  drawLines();  drawlamp();  drawbench();  glFlush();  }  void init() {  glClearColor(1.0, 1.0, 1.0, 0.0);  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  gluOrtho2D(0.0, 90.0, 0.0, 70.0);  }  int main(int argc, char\*\* argv) {  glutInit(&argc, argv);  glutInitDisplayMode(GLUT\_SINGLE | GLUT\_RGB);  glutInitWindowSize(840, 680);  glutCreateWindow("Scenario");  glutDisplayFunc(display);  init();  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-** |