**Lab Taks-3**

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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 windows(float x, float y, float r, float g, float b)  {  glBegin(GL\_POLYGON);  glColor3ub(r,g,b);  glVertex2i(x+10,y-4);  glVertex2i(x+10+35,y-4);  glVertex2f(x+10+35,y-28);  glVertex2i(x+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(x+10,y-4);  glVertex2i(x+10+35,y-4);  glVertex2f(x+10+35,y-28);  glVertex2i(x+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(r,g,b);  glVertex2i(x+10+35+10,y-4);  glVertex2f(x+10+35+10+35,y-4);  glVertex2i(x+10+35+10+35,y-28);  glVertex2i(x+10+35+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(x+10+35+10,y-4);  glVertex2f(x+10+35+10+35,y-4);  glVertex2i(x+10+35+10+35,y-28);  glVertex2i(x+10+35+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void buildingWithGrass(float x)  {  glLineWidth(4.5);  glBegin(GL\_POLYGON); //grass  glColor3ub(0,255,0);  glVertex2i(-200,-150);  glVertex2i(-200,-70);  glVertex2f(200,-70);  glVertex2i(200,-150);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //grass  glColor3ub(0,0,0);  glVertex2i(-200,-150);  glVertex2i(-200,-70);  glVertex2f(200,-70);  glVertex2i(200,-150);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //sky  glColor3ub(135, 206, 235);  glVertex2i(-200,-70);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2i(200,-70);  glEnd();  glBegin(GL\_POLYGON); //road  glColor3ub(194, 116, 14);  glVertex2i(-200,-100);  glVertex2i(-200,-125);  glVertex2f(200,-125);  glVertex2i(200,-100);  glEnd();  glBegin(GL\_POLYGON); //road  glColor3ub(194, 116, 14);  glVertex2i(-75+x,-100);  glVertex2i(-75+x,-80);  glVertex2f(-45+x,-80);  glVertex2i(-45+x,-100);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //road border  glColor3ub(0,0,0);  glVertex2i(-200,-100);  glVertex2i(-75+x,-100);  glVertex2i(-75+x,-80);  glVertex2i(-45+x,-80);  glVertex2i(-45+x,-100);  glVertex2i(200,-100);  glVertex2i(200,-125);  glVertex2f(-200,-125);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-110+x,-80);  glVertex2i(-110+x,80);  glVertex2f(-10+x,80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-110+x,-80);  glVertex2i(-110+x,80);  glVertex2f(-10+x,80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-10+x,80);  glVertex2i(0+x,70);  glVertex2f(0+x,-80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-10+x,80);  glVertex2i(0+x,70);  glVertex2f(0+x,-80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-110+x,80);  glVertex2i(-113+x,80);  glVertex2f(-113+x,85);  glVertex2f(-7+x,85);  glVertex2i(-7+x,80);  glVertex2f(-10+x,80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-110+x,80);  glVertex2i(-113+x,80);  glVertex2f(-113+x,85);  glVertex2f(-7+x,85);  glVertex2i(-7+x,80);  glVertex2f(-10+x,80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-10+x,80);  glVertex2i(-7+x,80);  glVertex2f(0+x,73);  glVertex2f(0+x,70);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-10+x,80);  glVertex2i(-7+x,80);  glVertex2f(0+x,73);  glVertex2f(0+x,70);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //door  glColor3ub(194, 214, 11);  glVertex2i(-70+x,-80);  glVertex2i(-70+x,-55);  glVertex2f(-50+x,-55);  glVertex2f(-50+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-70+x,-80);  glVertex2i(-70+x,-55);  glVertex2f(-50+x,-55);  glVertex2f(-50+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  windows(-110+x,-16, 00,20,200);  windows(-110+x,16, 00,20,200);  windows(-110+x,48, 0,20,200);  windows(-110+x,80, 0,20,200);  }  void display()  {  buildingWithGrass(40);  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 3 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(-200,200,-150,130);  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 xc, float yc, float r, float g, float b)  {  glLineWidth(7.5);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(r,g,b);  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+xc,y+yc );  }  glEnd();  }  void CircleBorder(float radius, float xc, float yc, float width)  {  glLineWidth(width);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(0,0,0);  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+xc,y+yc );  }  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void tree(float x)  {  glLineWidth(5);  glBegin(GL\_POLYGON);  glColor3ub(165,99,60);  glVertex2i(60+x,-80);  glVertex2i(60+x,00);  glVertex2i(80+x,00);  glVertex2f(80+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,00);  glVertex2i(60+x,-80);  glVertex2i(60+x,00);  glVertex2i(80+x,00);  glVertex2f(80+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(18, 40+x,7,0,176,65);  CircleBorder(18,40+x, 7,7);  Circle(18, 100+x,7,0,176,65);  CircleBorder(18,100+x, 7,7);  Circle(30, 70+x,28,0,176,65);  CircleBorder(30,70+x, 28,7);  Circle(10, 63+x,00,0,176,65);  CircleBorder(10,63+x, 00,7);  Circle(10, 77+x,00,0,176,65);  CircleBorder(10,77+x, 00,7);  Circle(12, 70+x,5,0,176,65);  Circle(15, 48+x,11,0,176,65);  Circle(15, 91+x,12,0,176,65);  }  void display()  {  glClearColor(.613f, 0.613f, 0.613f, 1.0f);  glClear(GL\_COLOR\_BUFFER\_BIT);  tree(-15);  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 3 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(-40,180,-150,110);  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-** |

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| **Question- 3**  Draw a lamppost with black background |
| **Graph Plot (Picture)-** |
| **Code-**  #include <windows.h>  #include <GL/glut.h>  #include <math.h>  void Circle(float radius, float xc, float yc, float r, float g, float b)  {  glLineWidth(7.5);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(r,g,b);  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+xc,y+yc );  }  glEnd();  }  void CircleBorder(float radius, float xc, float yc, float width)  {  glLineWidth(width);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(255,255,255);  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+xc,y+yc );  }  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void lampPost(float x)  {  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(170+x,-80);  glVertex2i(170+x,-70);  glVertex2f(180+x,-70);  glVertex2f(180+x,-80);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(174+x,-70);  glVertex2i(174+x,-20);  glVertex2f(176+x,-20);  glVertex2f(176+x,-70);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(165+x,-25);  glVertex2i(165+x,-27);  glVertex2f(185+x,-27);  glVertex2f(185+x,-25);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(172+x,-25);  glVertex2i(172+x,-35);  glVertex2f(178+x,-35);  glVertex2f(178+x,-25);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(255,255,255);  glVertex2i(170+x,-80);  glVertex2i(170+x,-70);  glVertex2f(180+x,-70);  glVertex2f(180+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(255,255,255);  glVertex2i(174+x,-70);  glVertex2i(174+x,-20);  glVertex2f(176+x,-20);  glVertex2f(176+x,-70);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(255,255,255);  glVertex2i(165+x,-25);  glVertex2i(165+x,-27);  glVertex2f(185+x,-27);  glVertex2f(185+x,-25);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(6, 175+x,-15,255,255,0);  CircleBorder(6, 175+x,-15,3);  Circle(4, 165+x,-23,255,255,0);  CircleBorder(4, 165+x,-23,3);  Circle(4, 185+x,-23,255,255,0);  CircleBorder(4, 185+x,-23,3);  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2f(172+x,-24);  glVertex2f(172+x,-35);  glVertex2f(178+x,-35);  glVertex2f(178+x,-24);  glEnd();  }  void display()  {  glClearColor(.0f, 0.0f, 0.0f, 1.0f);  glClear(GL\_COLOR\_BUFFER\_BIT);  lampPost(-30);  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 3 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(100,200,-100,10);  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-** |

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| **Question- 4**  Draw a bench |
| **Graph Plot (Picture)-**  b |
| **Code-**  #include <windows.h>  #include <GL/glut.h>  #include <math.h>  void bench(float x)  {  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(113+x,-45);  glVertex2i(118+x,-45);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(135+x,-45);  glVertex2i(140+x,-45);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(100+x,-72);  glVertex2i(106+x,-62);  glVertex2i(147+x,-62);  glVertex2f(153+x,-72);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(94, 43, 7);  glVertex2i(100+x,-72);  glVertex2i(153+x,-72);  glVertex2i(153+x,-75);  glVertex2i(100+x,-75);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(105+x,-75);  glVertex2i(110+x,-75);  glVertex2i(110+x,-82);  glVertex2f(105+x,-82);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(143+x,-75);  glVertex2i(148+x,-75);  glVertex2i(148+x,-82);  glVertex2f(143+x,-82);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(113+x,-75);  glVertex2i(118+x,-75);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(135+x,-75);  glVertex2i(140+x,-75);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(106+x,-60);  glVertex2i(106+x,-47);  glVertex2i(147+x,-47);  glVertex2i(147+x,-60);  glEnd();  glLineWidth(3.5);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(118+x,-60);  glVertex2f(113+x,-60);  glVertex2i(113+x,-62);  glVertex2i(118+x,-62);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-60);  glVertex2i(140+x,-60);  glVertex2i(140+x,-62);  glVertex2f(135+x,-62);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(118+x,-45);  glVertex2f(113+x,-45);  glVertex2i(113+x,-47);  glVertex2i(118+x,-47);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-45);  glVertex2i(140+x,-45);  glVertex2i(140+x,-47);  glVertex2f(135+x,-47);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(100+x,-72);  glVertex2i(106+x,-62);  glVertex2i(147+x,-62);  glVertex2f(153+x,-72);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(100+x,-72);  glVertex2i(153+x,-72);  glVertex2i(153+x,-75);  glVertex2i(100+x,-75);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(105+x,-75);  glVertex2i(110+x,-75);  glVertex2i(110+x,-82);  glVertex2f(105+x,-82);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(143+x,-75);  glVertex2i(148+x,-75);  glVertex2i(148+x,-82);  glVertex2f(143+x,-82);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(113+x,-75);  glVertex2i(118+x,-75);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-75);  glVertex2i(140+x,-75);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(106+x,-60);  glVertex2i(106+x,-47);  glVertex2i(147+x,-47);  glVertex2i(147+x,-60);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void display()  {  glClearColor(.613f, 0.613f, 0.613f, 1.0f);  glClear(GL\_COLOR\_BUFFER\_BIT);  bench(-25);  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 3 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(40,170,-110,-25);  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>  void Circle(float radius, float xc, float yc, float r, float g, float b)  {  glLineWidth(7.5);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(r,g,b);  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+xc,y+yc );  }  glEnd();  }  void CircleBorder(float radius, float xc, float yc, float width)  {  glLineWidth(width);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  for(int i=0;i<200;i++)  {  glColor3ub(0,0,0);  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+xc,y+yc );  }  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void windows(float x, float y, float r, float g, float b)  {  glBegin(GL\_POLYGON);  glColor3ub(r,g,b);  glVertex2i(x+10,y-4);  glVertex2i(x+10+35,y-4);  glVertex2f(x+10+35,y-28);  glVertex2i(x+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(x+10,y-4);  glVertex2i(x+10+35,y-4);  glVertex2f(x+10+35,y-28);  glVertex2i(x+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(r,g,b);  glVertex2i(x+10+35+10,y-4);  glVertex2f(x+10+35+10+35,y-4);  glVertex2i(x+10+35+10+35,y-28);  glVertex2i(x+10+35+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(x+10+35+10,y-4);  glVertex2f(x+10+35+10+35,y-4);  glVertex2i(x+10+35+10+35,y-28);  glVertex2i(x+10+35+10,y-28);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void buildingWithGrass(float x)  {  glLineWidth(4.5);  glBegin(GL\_POLYGON); //grass  glColor3ub(0,255,0);  glVertex2i(-200,-150);  glVertex2i(-200,-70);  glVertex2f(200,-70);  glVertex2i(200,-150);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //grass  glColor3ub(0,0,0);  glVertex2i(-200,-150);  glVertex2i(-200,-70);  glVertex2f(200,-70);  glVertex2i(200,-150);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //sky  glColor3ub(135, 206, 235);  glVertex2i(-200,-70);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2i(200,-70);  glEnd();  glBegin(GL\_POLYGON); //road  glColor3ub(194, 116, 14);  glVertex2i(-200,-100);  glVertex2i(-200,-125);  glVertex2f(200,-125);  glVertex2i(200,-100);  glEnd();  glBegin(GL\_POLYGON); //road  glColor3ub(194, 116, 14);  glVertex2i(-75+x,-100);  glVertex2i(-75+x,-80);  glVertex2f(-45+x,-80);  glVertex2i(-45+x,-100);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //road border  glColor3ub(0,0,0);  glVertex2i(-200,-100);  glVertex2i(-75+x,-100);  glVertex2i(-75+x,-80);  glVertex2i(-45+x,-80);  glVertex2i(-45+x,-100);  glVertex2i(200,-100);  glVertex2i(200,-125);  glVertex2f(-200,-125);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-110+x,-80);  glVertex2i(-110+x,80);  glVertex2f(-10+x,80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-110+x,-80);  glVertex2i(-110+x,80);  glVertex2f(-10+x,80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-10+x,80);  glVertex2i(0+x,70);  glVertex2f(0+x,-80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-10+x,80);  glVertex2i(0+x,70);  glVertex2f(0+x,-80);  glVertex2i(-10+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-110+x,80);  glVertex2i(-113+x,80);  glVertex2f(-113+x,85);  glVertex2f(-7+x,85);  glVertex2i(-7+x,80);  glVertex2f(-10+x,80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-110+x,80);  glVertex2i(-113+x,80);  glVertex2f(-113+x,85);  glVertex2f(-7+x,85);  glVertex2i(-7+x,80);  glVertex2f(-10+x,80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(255,0,0);  glVertex2i(-10+x,80);  glVertex2i(-7+x,80);  glVertex2f(0+x,73);  glVertex2f(0+x,70);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-10+x,80);  glVertex2i(-7+x,80);  glVertex2f(0+x,73);  glVertex2f(0+x,70);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //door  glColor3ub(194, 214, 11);  glVertex2i(-70+x,-80);  glVertex2i(-70+x,-55);  glVertex2f(-50+x,-55);  glVertex2f(-50+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(-70+x,-80);  glVertex2i(-70+x,-55);  glVertex2f(-50+x,-55);  glVertex2f(-50+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  windows(-110+x,-16, 00,20,200);  windows(-110+x,16, 00,20,200);  windows(-110+x,48, 0,20,200);  windows(-110+x,80, 0,20,200);  }  void lampPost(float x)  {  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(170+x,-80);  glVertex2i(170+x,-70);  glVertex2f(180+x,-70);  glVertex2f(180+x,-80);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(174+x,-70);  glVertex2i(174+x,-20);  glVertex2f(176+x,-20);  glVertex2f(176+x,-70);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(165+x,-25);  glVertex2i(165+x,-27);  glVertex2f(185+x,-27);  glVertex2f(185+x,-25);  glEnd();  Circle(6, 175+x,-15,255,255,0);  CircleBorder(6, 175+x,-15,5);  Circle(4, 165+x,-23,255,255,0);  CircleBorder(4, 165+x,-23,4);  Circle(4, 185+x,-23,255,255,0);  CircleBorder(4, 185+x,-23,4);  glBegin(GL\_POLYGON);  glColor3ub(0,0,100);  glVertex2i(172+x,-25);  glVertex2i(172+x,-35);  glVertex2f(178+x,-35);  glVertex2f(178+x,-25);  glEnd();  }  void tree(float x)  {  glLineWidth(5);  glBegin(GL\_POLYGON);  glColor3ub(165,99,60);  glVertex2i(60+x,-80);  glVertex2i(60+x,00);  glVertex2i(80+x,00);  glVertex2f(80+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,00);  glVertex2i(60+x,-80);  glVertex2i(60+x,00);  glVertex2i(80+x,00);  glVertex2f(80+x,-80);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(18, 40+x,7,0,176,65);  CircleBorder(18,40+x, 7,7);  Circle(18, 100+x,7,0,176,65);  CircleBorder(18,100+x, 7,7);  Circle(30, 70+x,28,0,176,65);  CircleBorder(30,70+x, 28,7);  Circle(10, 63+x,00,0,176,65);  CircleBorder(10,63+x, 00,7);  Circle(10, 77+x,00,0,176,65);  CircleBorder(10,77+x, 00,7);  Circle(12, 70+x,5,0,176,65);  Circle(15, 48+x,11,0,176,65);  Circle(15, 91+x,12,0,176,65);  }  void bench(float x)  {  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(113+x,-45);  glVertex2i(118+x,-45);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(135+x,-45);  glVertex2i(140+x,-45);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(100+x,-72);  glVertex2i(106+x,-62);  glVertex2i(147+x,-62);  glVertex2f(153+x,-72);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(94, 43, 7);  glVertex2i(100+x,-72);  glVertex2i(153+x,-72);  glVertex2i(153+x,-75);  glVertex2i(100+x,-75);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(105+x,-75);  glVertex2i(110+x,-75);  glVertex2i(110+x,-82);  glVertex2f(105+x,-82);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(143+x,-75);  glVertex2i(148+x,-75);  glVertex2i(148+x,-82);  glVertex2f(143+x,-82);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(113+x,-75);  glVertex2i(118+x,-75);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(135+x,-75);  glVertex2i(140+x,-75);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(194, 84, 6);  glVertex2i(106+x,-60);  glVertex2i(106+x,-47);  glVertex2i(147+x,-47);  glVertex2i(147+x,-60);  glEnd();  glLineWidth(3.5);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(118+x,-60);  glVertex2f(113+x,-60);  glVertex2i(113+x,-62);  glVertex2i(118+x,-62);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-60);  glVertex2i(140+x,-60);  glVertex2i(140+x,-62);  glVertex2f(135+x,-62);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(118+x,-45);  glVertex2f(113+x,-45);  glVertex2i(113+x,-47);  glVertex2i(118+x,-47);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-45);  glVertex2i(140+x,-45);  glVertex2i(140+x,-47);  glVertex2f(135+x,-47);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(100+x,-72);  glVertex2i(106+x,-62);  glVertex2i(147+x,-62);  glVertex2f(153+x,-72);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(100+x,-72);  glVertex2i(153+x,-72);  glVertex2i(153+x,-75);  glVertex2i(100+x,-75);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(105+x,-75);  glVertex2i(110+x,-75);  glVertex2i(110+x,-82);  glVertex2f(105+x,-82);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(143+x,-75);  glVertex2i(148+x,-75);  glVertex2i(148+x,-82);  glVertex2f(143+x,-82);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(113+x,-75);  glVertex2i(118+x,-75);  glVertex2i(118+x,-78);  glVertex2f(113+x,-78);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(135+x,-75);  glVertex2i(140+x,-75);  glVertex2i(140+x,-78);  glVertex2f(135+x,-78);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0);  glVertex2i(106+x,-60);  glVertex2i(106+x,-47);  glVertex2i(147+x,-47);  glVertex2i(147+x,-60);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void display()  {  buildingWithGrass(0);  tree(-15);  tree(-232);  lampPost(-30);  bench(-25);  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 3 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(-200,200,-150,130);  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-** |