**Lab Taks-4**

|  |
| --- |
| **Question- 1**  Draw the scenario of a traffic signal |
| **Graph Plot (Picture)-**  **(Not Needed)** |
| **Code-**  #include <windows.h>  #include <GL/glut.h>  #include <math.h>  #include <string.h>  void Circle(float radius, float xc, float yc, float r, float g, float b)  {  glLineWidth(7.5);  glBegin(GL\_POLYGON);// Draw a Red 1x1 Square centered at origin  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);// Draw a Red 1x1 Square centered at origin  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 car(float x, float y, int r1, int g1, int b1, int r2, int g2, int b2)  {  glBegin(GL\_POLYGON);  glColor3ub(r1,g1,b1); //body  glVertex2f(10+x,0+y);  glVertex2f(10+x,9+9+y);  glVertex2f(11+x,12+9+y);  glVertex2f(12.5+x,13+9+y);  glVertex2f(14.5+x,13+9+y);  glVertex2f(16+x,12+9+y);  glVertex2f(17+x,9+9+y);  glVertex2f(17+x,0+y);  glVertex2f(16+x,-2+y);  glVertex2f(11+x,-2+y);  glVertex2f(10+x,0+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //windshield  glVertex2f(11+x,6.5+5-0.5+y);  glVertex2f(16+x, 6.5+5-0.5+y);  glVertex2f(16.5+x, 8.5+5+1-0.5+y);  glVertex2f(14.5+x, 10+5+1-0.5+y);  glVertex2f(12.5+x, 10+5+1-0.5+y);  glVertex2f(10.5+x, 8.5+5+1-0.5+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //driver window right  glVertex2f(16.25+x,6.5+5-0.5+y);  glVertex2f(16.5+x, 6.5+5-0.5+y);  glVertex2f(16.75+x, 8.5+5+1-0.5+y);  glVertex2f(16.75+x, 6+2-0.5+y);  glVertex2f(16.25+x, 6+2-0.5+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //passenger window right  glVertex2f(16.25+x, 5.5+2-0.5+y);  glVertex2f(16.75+x, 5.5+2-0.5+y);  glVertex2f(16.75+x,1-0.5+y);  glVertex2f(16.25+x, 3+y);  glVertex2f(16.25+x, 7-0.5+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //driver window left  glVertex2f(10.75+x,6.5+5-0.5+y);  glVertex2f(10.5+x, 6.5+5-0.5+y);  glVertex2f(10.25+x, 8.5+5+1-0.5+y);  glVertex2f(10.25+x, 6+2-0.5+y);  glVertex2f(10.75+x, 6+2-0.5+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //passenger window left  glVertex2f(10.75+x, 5.5+2-0.5+y);  glVertex2f(10.25+x, 5.5+2-0.5+y);  glVertex2f(10.25+x,1-0.5+y);  glVertex2f(10.75+x, 3+y);  glVertex2f(10.75+x, 7-0.5+y);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(r2,g2,b2); //backshield  glVertex2f(11.25+x, 3+y);  glVertex2f(15.75+x, 3+y);  glVertex2f(16.50+x,0+y);  glVertex2f(10.5+x, 0+y);  glEnd();  glLineWidth(1.5);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //body  glVertex2f(10+x,0+y);  glVertex2f(10+x,9+9+y);  glVertex2f(11+x,12+9+y);  glVertex2f(12.5+x,13+9+y);  glVertex2f(14.5+x,13+9+y);  glVertex2f(16+x,12+9+y);  glVertex2f(17+x,9+9+y);  glVertex2f(17+x,0+y);  glVertex2f(16+x,-2+y);  glVertex2f(11+x,-2+y);  glVertex2f(10+x,0+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //windshield  glVertex2f(11+x,6.5+5-0.5+y);  glVertex2f(16+x, 6.5+5-0.5+y);  glVertex2f(16.5+x, 8.5+5+1-0.5+y);  glVertex2f(14.5+x, 10+5+1-0.5+y);  glVertex2f(12.5+x, 10+5+1-0.5+y);  glVertex2f(10.5+x, 8.5+5+1-0.5+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //driver window right  glVertex2f(16.25+x,6.5+5-0.5+y);  glVertex2f(16.5+x, 6.5+5-0.5+y);  glVertex2f(16.75+x, 8.5+5+1-0.5+y);  glVertex2f(16.75+x, 6+2-0.5+y);  glVertex2f(16.25+x, 6+2-0.5+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //passenger window right  glVertex2f(16.25+x, 5.5+2-0.5+y);  glVertex2f(16.75+x, 5.5+2-0.5+y);  glVertex2f(16.75+x,1-0.5+y);  glVertex2f(16.25+x, 3+y);  glVertex2f(16.25+x, 7-0.5+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glVertex2f(10.75+x,6.5+5-0.5+y);  glVertex2f(10.5+x, 6.5+5-0.5+y);  glVertex2f(10.25+x, 8.5+5+1-0.5+y);  glVertex2f(10.25+x, 6+2-0.5+y);  glVertex2f(10.75+x, 6+2-0.5+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //passenger window left  glVertex2f(10.75+x, 5.5+2-0.5+y);  glVertex2f(10.25+x, 5.5+2-0.5+y);  glVertex2f(10.25+x,1-0.5+y);  glVertex2f(10.75+x, 3+y);  glVertex2f(10.75+x, 7-0.5+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,0); //backshield  glVertex2f(11.25+x, 3+y);  glVertex2f(15.75+x, 3+y);  glVertex2f(16.50+x,0+y);  glVertex2f(10.5+x, 0+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void callCar(float x, float y, int r1, int g1, int b1, int r2, int g2, int b2, char dir)  {  if (dir == 'u')  {  car(x,y,r1,g1,b1,r2,g2,b2);  }  else if (dir == 'd')  {  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  glPushMatrix();  glRotatef(180, 0.0, 0.0, 1.0);  car(x,y,r1,g1,b1,r2,g2,b2);  glPopMatrix();  glutSwapBuffers();  }  else if (dir == 'r')  {  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  glPushMatrix();  glRotatef(270, 0.0, 0.0, 1.0);  car(x,y,r1,g1,b1,r2,g2,b2);  glPopMatrix();  glutSwapBuffers();  }  else if (dir == 'l')  {  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  glPushMatrix();  glRotatef(90, 0.0, 0.0, 1.0);  car(x,y,r1,g1,b1,r2,g2,b2);  glPopMatrix();  glutSwapBuffers();  }  else  {  }  }  void callCarAngle(float x, float y, int r1, int g1, int b1, int r2, int g2, int b2, float angle)  {  glMatrixMode(GL\_PROJECTION);  glLoadIdentity();  glPushMatrix();  glRotatef(angle, 0.0, 0.0, 1.0);  car(x,y,r1,g1,b1,r2,g2,b2);  glPopMatrix();  glutSwapBuffers();  }  void dividerLineV(float x, float y)  {  glBegin(GL\_LINES);  glColor3ub(255, 191, 0);  glVertex2f(55+x,65+y);  glVertex2f(55+x,50+y);  glEnd();  }  void dividerLineH(float x, float y)  {  glBegin(GL\_LINES);  glColor3ub(255, 191, 0);  glVertex2f(30+x,25+y);  glVertex2f(40+x,25+y);  glEnd();  }  void roadMap()  {  glBegin(GL\_POLYGON);  glColor3ub(103, 113, 130); //crossroads horizontal  glVertex2f(0,50);  glVertex2f(140,50);  glVertex2f(140,-50);  glVertex2f(0,-50);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(103, 113, 130); //crossroads vertical  glVertex2f(40,100);  glVertex2f(100,100);  glVertex2f(100,-100);  glVertex2f(40,-100);  glEnd();  glLineWidth(4);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0, 0, 00); //crossroads border  glVertex2f(0,50);  glVertex2f(40,50);  glVertex2f(40,100);  glVertex2f(100,100);  glVertex2f(100,50);  glVertex2f(140,50);  glVertex2f(140,-50);  glVertex2f(100,-50);  glVertex2f(100,-100);  glVertex2f(40,-100);  glVertex2f(40,-50);  glVertex2f(0,-50);  glVertex2f(0,50);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON);  glColor3ub(46, 47, 48); //crossroads divider vertical 1  glVertex2f(69,100);  glVertex2f(71,100);  glVertex2f(71,50);  glVertex2f(69,50);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(46, 47, 48); //crossroads divider vertical 2  glVertex2f(69,-100);  glVertex2f(71,-100);  glVertex2f(71,-50);  glVertex2f(69,-50);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(46, 47, 48); //crossroads divider horizo 1  glVertex2f(0,1);  glVertex2f(40,1);  glVertex2f(40,-1);  glVertex2f(0,-1);  glEnd();  glBegin(GL\_POLYGON);  glColor3ub(46, 47, 48); //crossroads divider horizo 2  glVertex2f(100,1);  glVertex2f(140,1);  glVertex2f(140,-1);  glVertex2f(100,-1);  glEnd();  Circle(1,70, 0, 46,47,48);  dividerLineV(0,0);  dividerLineV(0,25);  dividerLineV(30,0);  dividerLineV(30,25);  dividerLineV(0,-115);  dividerLineV(0,-140);  dividerLineV(30,-115);  dividerLineV(30,-140);  dividerLineH(0,0);  dividerLineH(-17,0);  dividerLineH(-34,0);  dividerLineH(0,-50);  dividerLineH(-17,-50);  dividerLineH(-34,-50);  dividerLineH(0+104,0);  dividerLineH(-17+104,0);  dividerLineH(-34+104,0);  dividerLineH(0+104,-50);  dividerLineH(-17+104,-50);  dividerLineH(-34+104,-50);  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(48,65-15);  glVertex2f(48,53-15);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(46,50);  glVertex2f(48,52);  glVertex2f(50,50);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(40,37);  glVertex2f(70,37);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(70,39);  glVertex2f(72,37);  glVertex2f(70,35);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(40+30,37-75);  glVertex2f(70+30,37-75);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(70,-40);  glVertex2f(68,-38);  glVertex2f(70,-36);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(48+45,65-104);  glVertex2f(48+45,53-104);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(91,-51);  glVertex2f(93,-53);  glVertex2f(95,-51);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(48,65-65);  glVertex2f(48,15-65);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(46,50-50);  glVertex2f(48,52-50);  glVertex2f(50,50-50);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(40+0,37-75);  glVertex2f(48+0,37-75);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(70-30,-40);  glVertex2f(68-30,-38);  glVertex2f(70-30,-36);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(43+50,37);  glVertex2f(50+50,37);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(70+30,39);  glVertex2f(72+30,37);  glVertex2f(70+30,35);  glEnd();  glBegin(GL\_LINES);  glColor3ub(255, 255, 255);  glVertex2f(48+45,60-10);  glVertex2f(48+45,8-10);  glEnd();  glBegin(GL\_TRIANGLES);  glColor3ub(255, 255, 255);  glVertex2f(91,-51+50);  glVertex2f(93,-53+50);  glVertex2f(95,-51+50);  glEnd();  }  void trafficSignal()  {  Circle(2,37,53,4,44,189);  Circle(2,37+66,53,4,44,189);  Circle(2,37+66,53-106,4,44,189);  Circle(2,37,53-106,4,44,189);  CircleBorder(2,37,53,4);  CircleBorder(2,37+66,53,4);  CircleBorder(2,37+66,53-106,4);  CircleBorder(2,37,53-106,4);  glLineWidth(9);  glBegin(GL\_LINES);  glColor3ub(0, 0, 0);  glVertex2f(37,53);  glVertex2f(37,48);  glEnd();  Circle(1.5,37-0.75,53-8,255,0,0);  Circle(1.5,37-0.75,53-17,78,79,82);  Circle(1.5,37-0.75,53-12.5,78,79,82);  CircleBorder(1.5,37-0.75,53-8,4);  CircleBorder(1.5,37-0.75,53-17,4);  CircleBorder(1.5,37-0.75,53-12.5,4);  glLineWidth(20);  glBegin(GL\_LINES);  glColor3ub(1, 12, 125);  glVertex2f(37,48);  glVertex2f(37,33);  glEnd();  glLineWidth(9);  glBegin(GL\_LINES);  glColor3ub(0, 0, 0);  glVertex2f(37+66,53-106);  glVertex2f(37+66,53-91);  glEnd();  Circle(1.5,37-1+67.75,53-8-81,78,79,82); //green  Circle(1.5,37-1+67.75,53-17-81,255,0,0); //red  Circle(1.5,37-1+67.75,53-12.5-81,78,79,82); //yellow  CircleBorder(1.5,37-1+67.75,53-8-81,4);  CircleBorder(1.5,37-1+67.75,53-17-81,4);  CircleBorder(1.5,37-1+67.75,53-12.5-81,4);  glLineWidth(20);  glBegin(GL\_LINES);  glColor3ub(1, 12, 125);  glVertex2f(37+66,53-106+5);  glVertex2f(37+66,53-91+5);  glEnd();  glLineWidth(9);  glBegin(GL\_LINES);  glColor3ub(0, 0, 0);  glVertex2f(37,53-106);  glVertex2f(37+10,53-106);  glEnd();  Circle(1.5,37+13.75,53-106-2,0,204,58); //green  Circle(1.5,37+6.25,53-106-2,78,79,82); //red  Circle(1.5,37+10,53-106-2,246,255,0); //yellow  CircleBorder(1.5,37+13.75,53-106-2,4);  CircleBorder(1.5,37+6.25,53-106-2,4);  CircleBorder(1.5,37+10,53-106-2,4);  glLineWidth(20);  glBegin(GL\_LINES);  glColor3ub(1, 12, 125);  glVertex2f(37+4,53-106);  glVertex2f(37+16,53-106);  glEnd();  glLineWidth(9);  glBegin(GL\_LINES);  glColor3ub(0, 0, 0);  glVertex2f(37+56,53);  glVertex2f(37+66,53);  glEnd();  Circle(1.5,37+13.75+38.5,53+2,0,204,58); //green  Circle(1.5,37+13.75+46.2,53+2,78,79,82); //red  Circle(1.5,37+13.75+42.25,53+2,78,79,82); //yellow  CircleBorder(1.5,37+13.75+38.5,53+2,4);  CircleBorder(1.5,37+13.75+46.2,53+2,4);  CircleBorder(1.5,37+13.75+42.25,53+2,4);  glLineWidth(20);  glBegin(GL\_LINES);  glColor3ub(1, 12, 125);  glVertex2f(37+50,53);  glVertex2f(37+62,53);  glEnd();  }  void Cars()  {  callCar(30,-75, 255,0,0,0,0,255,'r');  callCar(30,-105, 0, 71, 186,100,0,0,'r');  callCar(30+19,-75, 190, 204, 0,0,0,255,'r');  callCar(30+19,-105, 10, 193, 207,100,0,0,'r');  callCar(30+19,-105, 255, 193, 207,18, 158, 133,'l');  callCar(30,-105+30, 10, 255, 207,0,0,200,'l');  callCar(30+19,-105+30, 10, 193, 207,100,0,0,'l');  callCar(30,-105, 115, 0, 255,77, 237, 14,'l');  callCar(30+4,-105+10, 115, 0, 255,77, 237, 14,'u');  callCarAngle(30-11,-105+70, 242, 61, 48,0, 2, 255,30);  callCar(30,-105+170, 28, 240, 0,0, 0, 255,'l');  callCar(30+19,-105+20, 0, 74, 11,255, 0, 14,'u');  callCar(30+19,-105+70, 158, 97, 11,0, 0, 255,'u');  callCar(30+19,-105+110, 67, 1, 82,0, 0, 255,'u');  callCar(30+5,-105+140, 120, 133, 7,0, 0, 255,'u');  callCar(30+19,-105+170, 201, 4, 27,0, 0, 255,'u');  callCar(30+19,-105+160, 201, 4, 27,0, 0, 255,'d');  callCar(30+19,-105+110, 170, 6, 199,0, 0, 255,'d');  callCar(30+19,-105+50, 54, 46, 46,0, 0, 255,'d');  callCar(30+4,-105+150, 4, 148, 114,0, 0, 255,'d');  callCar(30+4,-105+90,0, 3, 191,255, 0, 0,'d');  callCar(30+4,-105,153, 154, 199,255, 0, 0,'d');  callCarAngle(22,-44,0, 0, 0,255, 0, 0,200);  callCar(30,-75+140, 255,0,0,0,0,255,'r');  }  void display()  {  glClearColor(0.0f, 0.459f, 0.2f, 1.0f);  glClear(GL\_COLOR\_BUFFER\_BIT);  roadMap();  Cars();  trafficSignal();  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1300, 1300);  glutCreateWindow("lab task 4 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(0,140,-100,100);  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-** |

|  |
| --- |
| **Question- 2**  Draw two village scenarios for day and night |
| **Graph Plot (Picture)-**  **(Not Needed)** |
| **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);// Draw a Red 1x1 Square centered at origin  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);// Draw a Red 1x1 Square centered at origin  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 skyDay()  {  glBegin(GL\_POLYGON); //sky  glColor3ub(46, 222, 232);  glVertex2i(-200,60);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2f(200,60);  glEnd();  Circle(15, 140,120,234,242,0);  CircleBorder(15, 140,120,2);  glLineWidth(4);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //sky  glColor3ub(0,0,0);  glVertex2i(-200,60);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2f(200,60);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void skyNight()  {  glBegin(GL\_POLYGON); //sky  glColor3ub(0, 0, 0);  glVertex2i(-200,60);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2f(200,60);  glEnd();  Circle(15, 140,120,255,255,255);  CircleBorder(15, 140,120,2);  glLineWidth(4);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //sky  glColor3ub(255,255,255);  glVertex2i(-200,60);  glVertex2i(-200,150);  glVertex2f(200,150);  glVertex2f(200,60);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(0.5, 79,110,255,255,255);  Circle(0.5, -23,90,255,255,255);  Circle(0.5, 138,70,255,255,255);  Circle(0.5, -177,130,255,255,255);  Circle(0.5, -190,67,255,255,255);  Circle(0.5, -78,142,255,255,255);  Circle(0.5, 90,100,255,255,255);  Circle(0.5, 50,159,255,255,255);  Circle(0.5, 105,89,255,255,255);  Circle(0.5, 40,100,255,255,255);  Circle(0.5, 78,82,255,255,255);  Circle(0.5, 76,99,255,255,255);  Circle(0.5, 38,134,255,255,255);  }  void background()  {  glBegin(GL\_POLYGON); //river  glColor3ub(0,0,100);  glVertex2i(-200,-150);  glVertex2i(-200,-60);  glVertex2f(200,-60);  glVertex2f(200,-150);  glEnd();  glBegin(GL\_POLYGON); //grass  glColor3ub(0,55,0);  glVertex2i(-200,-60);  glVertex2i(-200,60);  glVertex2f(200,60);  glVertex2f(200,-60);  glEnd();  skyDay();  //skyNight();  glLineWidth(4);  glBegin(GL\_POLYGON); //road  glColor3ub(150, 80, 0);  glVertex2i(-200,-10);  glVertex2i(200,-10);  glVertex2f(200,-30);  glVertex2f(-200,-30);  glEnd();  glBegin(GL\_POLYGON); //road  glColor3ub(150, 80, 0);  glVertex2i(-38,-10);  glVertex2i(-38,10);  glVertex2i(-16,10);  glVertex2i(-16,-10);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //road  glColor3ub(0,0,0);  glVertex2i(-200,-10);  glVertex2i(-38,-10);  glVertex2i(-38,10);  glVertex2i(-16,10);  glVertex2i(-16,-10);  glVertex2i(200,-10);  glVertex2f(200,-30);  glVertex2f(-200,-30);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glLineWidth(6);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //river  glColor3ub(0,0,0);  glVertex2i(-200,-150);  glVertex2i(-200,-60);  glVertex2f(200,-60);  glVertex2f(200,-150);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //grass  glColor3ub(0,0,0);  glVertex2i(-200,-60);  glVertex2i(-200,60);  glVertex2f(200,60);  glVertex2f(200,-60);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void sailboat()  {  Circle(13, 140,-65,89,26,4);  CircleBorder(13,140,-65, 4);  glBegin(GL\_POLYGON); //sailboat p2  glColor3ub(89, 26, 4);  glVertex2i(110,-52);  glVertex2i(140,-52);  glVertex2f(140,-70);  glVertex2f(110,-70);  glEnd();  glLineWidth(10);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //sailboat p2  glColor3ub(0,0,0);  glVertex2i(70,-70);  glVertex2i(180,-70);  glVertex2f(160,-90);  glVertex2f(90,-90);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(13, 110,-65,255,0,0);  CircleBorder(13,110,-65, 4);  //Circle(13, 140,-65,255,0,0);  glBegin(GL\_POLYGON); //sailboat p1  glColor3ub(176, 52, 9);  glVertex2i(70,-70);  glVertex2i(180,-70);  glVertex2f(160,-90);  glVertex2f(90,-90);  glEnd();  glBegin(GL\_LINES); //sailboat sail rod  glColor3ub(0,0,0);  glVertex2i(125,-52);  glVertex2i(125,-2);  glEnd();  glBegin(GL\_POLYGON); //sailboat sail  glColor3ub(232,79,19);  glVertex2i(80,-47);  glVertex2i(125,-0);  glVertex2f(170,-47);  glEnd();  glLineWidth(5);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //sailboat sail  glColor3ub(0,0,0);  glVertex2i(80,-47);  glVertex2i(125,-0);  glVertex2f(170,-47);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glLineWidth(4);  glBegin(GL\_LINES);  glColor3ub(0,0,00);  glVertex2i(110,-52);  glVertex2i(140,-52);  glEnd();  }  void house1()  {  glLineWidth(5);  glBegin(GL\_POLYGON); //house p1  glColor3ub(89, 46, 3);  glVertex2i(-100,30+20);  glVertex2i(-80,65+20);  glVertex2i(-75,60+20);  glVertex2i(-95,27+20);  glEnd();  glBegin(GL\_POLYGON); //house p2  glColor3ub(89, 46, 3);  glVertex2i(-80,65+20);  glVertex2i(-60,27+20);  glVertex2i(-55,30+20);  glVertex2i(-75,65+20);  glEnd();  glBegin(GL\_POLYGON); //house roof  glColor3ub(89, 46, 3);  glVertex2i(-60,65+20);  glVertex2i(-10,65+20);  glVertex2i(10,27+20);  glVertex2i(-75,65+20);  glEnd();  glBegin(GL\_POLYGON); //house  glColor3ub(89, 46, 3);  glVertex2i(-75,65+20);  glVertex2i(-60,27+20);  glVertex2i(10,27+20);  glVertex2i(-75,65+20);  glEnd();  glBegin(GL\_POLYGON); //house body  glColor3ub(242, 121, 0);  glVertex2i(-95,27+20);  glVertex2i(-76,58+20);  glVertex2i(-60,27+20);  glVertex2i(-60,-15+20);  glVertex2i(-95,-15+20);  glEnd();  glBegin(GL\_POLYGON); //house body  glColor3ub(242, 121, 0);  glVertex2i(-60,27+20);  glVertex2i(5,27+20);  glVertex2i(5,-15+20);  glVertex2i(-60,-15+20);  glEnd();  glBegin(GL\_POLYGON); //house floor  glColor3ub(122, 63, 4);  glVertex2i(-100,-15+20);  glVertex2i(10,-15+20);  glVertex2i(10,-20+20);  glVertex2i(-100,-20+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house p1  glColor3ub(0,0,0);  glVertex2i(-100,30+20);  glVertex2i(-80,65+20);  glVertex2i(-75,60+20);  glVertex2i(-95,27+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house p2  glColor3ub(0,0,0);  glVertex2i(-80,65+20);  glVertex2i(-60,27+20);  glVertex2i(-55,30+20);  glVertex2i(-75,65+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house roof  glColor3ub(0,0,0);  glVertex2i(-75,65+20);  glVertex2i(-10,65+20);  glVertex2i(10,27+20);  glVertex2i(-53,27+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house body  glColor3ub(0,0,0);  glVertex2i(-95,27+20);  glVertex2i(-76,58+20);  glVertex2i(-60,27+20);  glVertex2i(-60,-15+20);  glVertex2i(-95,-15+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house body  glColor3ub(0,0,0);  glVertex2i(-60,27+20);  glVertex2i(5,27+20);  glVertex2i(5,-15+20);  glVertex2i(-60,-15+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house floor  glColor3ub(0,0,0);  glVertex2i(-100,-15+20);  glVertex2i(10,-15+20);  glVertex2i(10,-20+20);  glVertex2i(-100,-20+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house window  glColor3ub(245, 49, 5);  glVertex2i(17-100,25);  glVertex2i(29-100,25);  glVertex2i(29-100,35);  glVertex2i(17-100,35);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house window border  glColor3ub(0,0,0);  glVertex2i(17-100,25);  glVertex2i(29-100,25);  glVertex2i(29-100,35);  glVertex2i(17-100,35);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house door  glColor3ub(245, 49, 5);  glVertex2i(16-50,25-20);  glVertex2i(30-50,25-20);  glVertex2i(30-50,45-20);  glVertex2i(16-50,45-20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house door  glColor3ub(0,0,0);  glVertex2i(16-50,25-20);  glVertex2i(30-50,25-20);  glVertex2i(30-50,45-20);  glVertex2i(16-50,45-20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void house2()  {  glBegin(GL\_POLYGON); //house roof  glColor3ub(89, 46, 3);  glVertex2i(-60+30,65+20);  glVertex2i(-10+30,65+20);  glVertex2i(-30+30,27+20);  glVertex2i(-45+30,65+20);  glEnd();  glLineWidth(5);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house roof  glColor3ub(0,0,00);  glVertex2i(-60+30,65+20);  glVertex2i(-10+30,65+20);  glVertex2i(-30+30,27+20);  glVertex2i(-45+30,65+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house p1  glColor3ub(89, 46, 3);  glVertex2i(-100+100,30+20);  glVertex2i(-80+100,65+20);  glVertex2i(-75+100,60+20);  glVertex2i(-95+100,27+20);  glEnd();  glBegin(GL\_POLYGON); //house p2 roof  glColor3ub(89, 46, 3);  glVertex2i(-80+100,65+20);  glVertex2i(-60+100,27+20);  glVertex2i(-55+100,30+20);  glVertex2i(-75+100,65+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house p1  glColor3ub(0,0,00);  glVertex2i(-100+100,30+20);  glVertex2i(-80+100,65+20);  glVertex2i(-75+100,60+20);  glVertex2i(-95+100,27+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house p2 roof  glColor3ub(0,0,00);  glVertex2i(-80+100,65+20);  glVertex2i(-60+100,27+20);  glVertex2i(-55+100,30+20);  glVertex2i(-75+100,65+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house body  glColor3ub(255,0,0);  glVertex2i(-95+100,27+20);  glVertex2i(-76+100,58+20);  glVertex2i(-60+100,27+20);  glVertex2i(-60+100,-10+20);  glVertex2i(-95+100,-10+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house body  glColor3ub(0,0,0);  glVertex2i(-95+100,27+20);  glVertex2i(-76+100,58+20);  glVertex2i(-60+100,27+20);  glVertex2i(-60+100,-10+20);  glVertex2i(-95+100,-10+20);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house floor  glColor3ub(122, 63, 4);  glVertex2i(-100+105,-15+25);  glVertex2i(-60+105,-15+25);  glVertex2i(-60+105,-20+25);  glVertex2i(-100+105,-20+25);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house floor  glColor3ub(0,0,0);  glVertex2i(-100+105,-15+25);  glVertex2i(-60+105,-15+25);  glVertex2i(-60+105,-20+25);  glVertex2i(-100+105,-20+25);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  glBegin(GL\_POLYGON); //house 2 window  glColor3ub(0,100,0);  glVertex2i(17,30);  glVertex2i(29,30);  glVertex2i(29,40);  glVertex2i(17,40);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON); //house 2 window  glColor3ub(0,00,0);  glVertex2i(17,30);  glVertex2i(29,30);  glVertex2i(29,40);  glVertex2i(17,40);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  }  void tree(float x, float y)  {  glLineWidth(5);  glBegin(GL\_POLYGON);  glColor3ub(165,99,60);  glVertex2i(60+x,-80+y);  glVertex2i(60+x,00+y);  glVertex2i(80+x,00+y);  glVertex2f(80+x,-80+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_LINE);  glBegin(GL\_POLYGON);  glColor3ub(0,0,00);  glVertex2i(60+x,-80+y);  glVertex2i(60+x,00+y);  glVertex2i(80+x,00+y);  glVertex2f(80+x,-80+y);  glEnd();  glPolygonMode(GL\_FRONT\_AND\_BACK, GL\_FILL);  Circle(18, 40+x,7+y,0,176,65);  CircleBorder(18,40+x, 7+y,7);  Circle(18, 100+x,7+y,0,176,65);  CircleBorder(18,100+x, 7+y,7);  Circle(30, 70+x,28+y,0,176,65);  CircleBorder(30,70+x, 28+y,7);  Circle(10, 63+x,00+y,0,176,65);  CircleBorder(10,63+x, 00+y,7);  Circle(10, 77+x,00+y,0,176,65);  CircleBorder(10,77+x, 00+y,7);  Circle(12, 70+x,5+y,0,176,65);  Circle(15, 48+x,11+y,0,176,65);  Circle(15, 91+x,12+y,0,176,65);  }  void display()  {  background();  sailboat();  tree(-170,90);  tree(-70,80);  house2();  house1();  glFlush();  }  int main(int argc, char\*\* argv)  {  glutInit(&argc, argv);  glutInitWindowSize(1200, 1200);  glutCreateWindow("lab task 4 [22-47226-1]");  glutDisplayFunc(display);  gluOrtho2D(-200,200,-150,150);  glutMainLoop();  return 0;  } |
| **Output Screenshot (Full Screen)-**    [P.T.O] |