MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 305: COMPUTER GRAPHICS

DATE: 23/7/2019 **TIME: 2.00-4.00 PM**

INSTRUCTIONS

Answer question **ONE** and **Any** other **Two** among the four selective questions

QUESTION ONE (COMPULSORY)

a) Explain four major operations that are performed in computer graphics (8 marks)

b) Explain any three types of transformation apart from translation (6 marks)

c) Explain any three properties of display devices in relation to graphics (6 marks)

d) Define Fractal graphics (2 marks)

e) Draw the output of the openGl program shown below (8 marks)

```
#include<GL/glut.h>
#include<stdio.h>
void display()
{
glClear(GL_COLOR_BUFFER_BIT);
glColor3f(1.0,0.0,0.0);
glPointSize(2.0);
glBegin(GL_POINTS);
glVertex2f(0.0,0.0);
glVertex2f(0.0,0.5);
glEnd();
glBegin(GL_LINES);
glVertex2f(0.0,0.0);
glVertex2f(0.0,0.5);
glEnd();
glBegin(GL_POLYGON);
glVertex2f(0.0,0.0);
glVertex2f(0.0,0.5);
```

```
glEnd();
glFlush();
}
void myinit()
 {
glClearColor(0.0,0.0,0.0,1.0);
gluOrtho2D(-1.0,1.0,-1.0,1.0);
 }
void main(int argc, char **argv)
{
glutInit(&argc,argv);
glutInitDisplayMode(GLUT_RGB|GLUT_SINGLE);
 glutInitWindowSize(500,500);
 glutInitWindowPosition(0,0);
 glutCreateWindow("Simple demo");
myinit();
glutDisplayFunc(display);
glutMainLoop();
}
```

QUESTION TWO

a) Draw on Cartesian plane the image drawn by code segment below (6 marks)

```
 glTranslatef(2.0, 0.0, 0.0);
glutSolidSphere(1.0, 32, 32);
glPushMatrix();
glTranslatef(2.0, 2.0, 0.0);
glutSolidSphere(1.0, 32, 32);
glPopMatrix();
glTranslatef(-2.0, 0.0, 0.0);
glutSolidSphere(1.0, 32, 32);
glTranslatef(0.0, 2.0, 0.0);
glutSolidSphere(1.0, 32, 32);
glPopMatrix();
```

b) Using diagram of a house, differentiate parallel and orthographic projects (8 marks)

(a) Explain any four 2D Computer Graphics that are closely related to the six output functions of. **Graphical Kernel System** (GKS) (6 marks)

QUESTION THREE

a) Using relevant diagrams, describe Cohen Sutherland algorithm (9 marks)

b) Discuss the following stages of graphics and rendering pipeline

i. Application Stage (3 marks)

ii. Geometry Stage (3 marks)

iii. Rasterization Stage (3 marks)

c) Define computer graphics

QUESTION FOUR

a) Explain the three basic elements for drawing in computer graphics (6 marks)

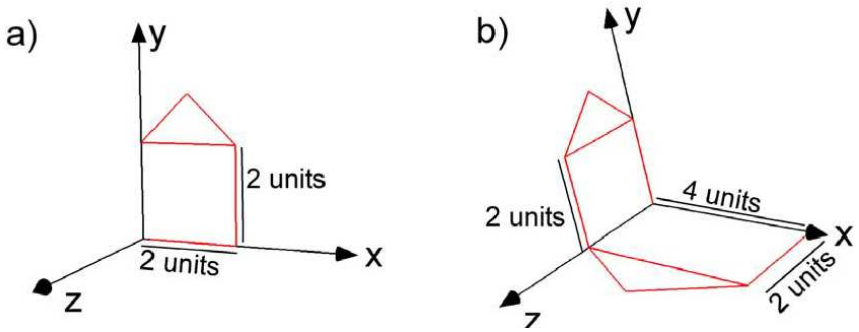
b) Explain the application of computer graphics in the following areas including diagrams

i. CAD (5 marks)

ii. In Movies (5 marks)

d) Given is a function *drawHouse()* which draws a wire frame house in the xy-plane as shown in part (a) of the image below. Write OpenGL transformations for converting (a) into (b)

(4 marks)



QUESTION FIVE

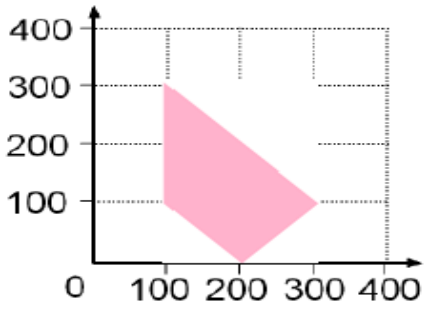
a) Explain the following (6 marks)

(i) Bresenham algorithm

(ii) Mid Circle Drawing algorithm

b) Given the image below, produce the same image when placed in a room with some sunlight rays, reflective surfaces and then translated by 50 units in x and 100 units in y. Include the header (My Diagram) and clip it at y>=150, y<=300 and x>=150, x<=320.

(8 marks)



c) Using graphical images, explain three basic elements for drawing in computer graphics

(6 marks)