MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE) AND

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SCO 305: COMPUTER GRAPHICS

DATE: 10/3/2023 **TIME: 2.00-4.00 PM**

INSTRUCTION

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

QUESTION ONE (COMPULSORY) (30 MARKS)

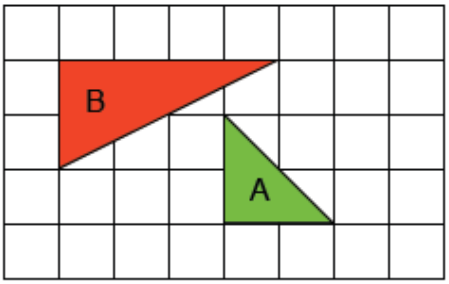
a) Using relevant examples, demonstrate four basic principles in graphics design (8 marks)

b) Draw the shape produced by the openGl function code below (5 marks)

```
void display(void)
{
// clear all pixels in frame buffer
glClear(GL_COLOR_BUFFER_BIT);
glColor3f(0.0, 0.0, 0.0); glBegin(GL_QUADS); glVertex2f(300, 100); glVertex2f(100, 300);
glVertex2f(100, 100); glVertex2f(200, 0); glEnd(); glFlush();
```

c) Describe the rasterization steps for a rectangle (5 marks)

d) Describe the transform needed to transform the triangle from A to B in Figure below, (6 marks)



e) List three

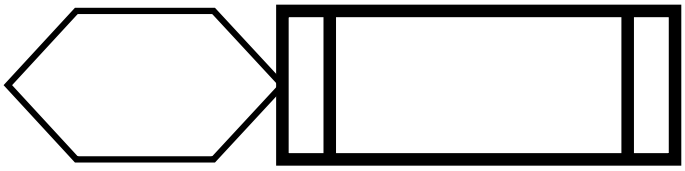
i. types of text clipping (3 marks)

ii. basic drawing elements in computer graphics (3 marks)

QUESTION TWO (20 MARKS)

a) By use of mathematical equations, show the relationship between Cartesian coordinates and polar coordinate. (5 marks)

b) Write an openGl sectional code to produce the image with a white surface given below (7 marks)



c) Use DDA algorithm to plot a line A (2,8) and B (6,12) (8 marks)

QUESTION THREE (20 MARKS)

a) Explain orthographic projections by using an example of a diagram of house (6 marks)

b) Identify any two types of curves and describe how each one of them supports nature as one of the applications of fractal geometry (8 marks)

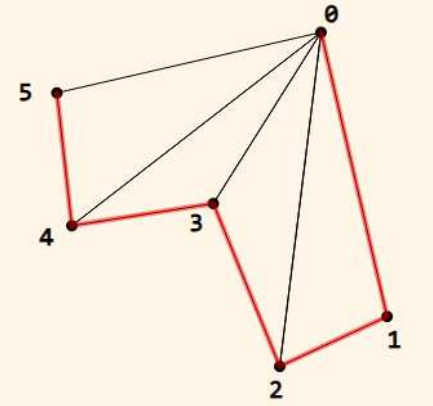
c) Explain the application of computer graphics in the following areas (6 marks)

i. Virtualization

ii. Image processing

QUESTION FOUR (20 MARKS)

a) Write an OpenGl sectional code to produce the image of triangular fan below **(7 Marks**



b) Use the Cohen Sutherland algorithm to clip line P1 (70,20) and P2(100,10) against a window lower left hand corner (50,10) and upper right hand corner (80,40). **(8 Marks)**

c) Assuming a video of an athlete in a race, analyze the video using key frame animation and inverse kinematics **(5 Marks)**

QUESTION FIVE (20 MARKS)

a) Illustrate using a diagram the 3-D viewing pipeline (6 marks)

b) List four commercial graphics software (4 marks)

c) Describe seed fill algorithm (5 marks)

d) Write an OpenGl code that will generate the image with a red surface and 70% opacity shown below (5 marks)