



The Co-operative University of Kenya

END OF SEMESTER EXAMINATION DECEMBER 2022

**EXAMINATION FOR THE BACHELOR OF
(YEAR 2 SEMESTER I)**

UNIT CODE: BCSC 2105

UNIT TITLE: COMPUTER AIDED ART AND DESIGN

DATE: THDECEMBER, 2022

TIME: XX:00 AM – XX:00 AM

INSTRUCTIONS:

- Answer question **ONE (compulsory)** and any other **TWO** questions

QUESTION ONE

- Outline two benefits of Computer Aided Design system over manual drawing.
(2 marks)
- Explain the term *full associative* as used in Computer Aided Design systems.
(2 marks)
- Distinguish between interactive and non-interactive computer graphics stating an example in each.
(4 marks)
- Computer Aided Manufacturing is divided into two broad categories. Explain the two categories.
(4 marks)
- Direct Numerical Control (DNC) system consists of four basic components. Explain two of these components.
(4 marks)
- With the aid of a diagram distinguish between *relative* and *absolute* coordinates system.
(4 marks)
- There are three naming conventions applied in OpenGL functions declaration. Explain two.
(4 marks)
- The graphic image displayed in figure 1 was generated using OpenGL. Given a window size of (600, 600), a window position of (50, 50) and vertices A (-0.8, 0.7), B(-0.2, 0.7) C (-0.2, 0.1 and D (-0.8, 0.1). Write the code for its display function.
(6 marks)

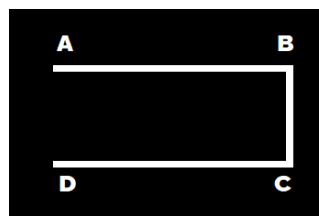


Figure 1

QUESTION TWO

- a) State two functionalities supported by GLUT. **(2 marks)**
- b) B-Rep is a method for representing shapes using the limits. Explain two parts of its model. **(4 marks)**
- c) Explain how you can use command line option in LibreCAD to draw the following objects (Show the command structure) **(6 marks)**
 - i. Circle at coordinate 0,0 and radius 12
 - ii. Rectangle at coordinate 0,0 length 9 and height 5
- d) Using the Cohen Sutherland algorithm clip line given by point P1(10,30) and P2(80,90) in figure 2 and provide the coordinates of the new points of the line. **(8 marks)**

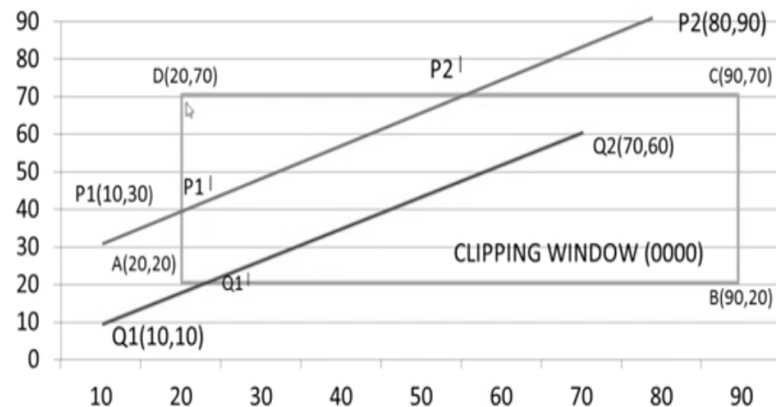


Figure 2

QUESTION THREE

- a) State the two functions used in OpenGL to set the foreground and background color. **(2 mark)**
- b) Explain two geometric modeling approaches available to designers on CAD/CAM systems. **(4 marks)**
- c) Discuss two categories of Numerical Control as used in Computer Aided Manufacturing. **(4 marks)**
- d) With the aid of a Diagram explain the morphology of design, clearly showing how the CAD function integrates with the whole design process. **(8 marks)**

QUESTION FOUR

- a) Outline two criteria stipulated for line drawing displays. **(2 marks)**
- b) Explain the term Bezier surface as used in geometric modeling. **(2 marks)**
- c) Distinguish between 2 D and 3 D as used in Computer Aided Design, stating an example in each. **(4 marks)**
- d) To utilize Numerical Control in manufacturing, FIVE steps are necessary. Discuss the first three steps. **(6 marks)**

- e) The image in figure 3 was created using vertices $(-0.8, -0.8)$, $(0.8, -0.8)$ and $(0, 0.9)$.
Write an OpenGL code that will generate the figure. **(6 marks)**

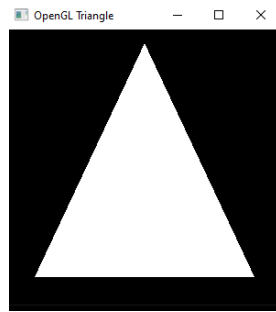


Figure 3

QUESTION FIVE

- a) Outline four advantages of Computer Aided Manufacturing **(4 marks)**
- b) Distinguish between *greyscale frame buffer* and *pseudo-color frame buffer*. **(4 marks)**
- c) Explain two key libraries used to support OpenGL projects. **(4 marks)**
- d) Existing CAD/CAM systems provide designers with both analytic and synthetic entities. Discuss four surfaces found in analytic entities. **(8 marks)**