# SOUTH EASTERN KENYA UNIVERSITY

## UNIVERSITY EXAMINATIONS 2023/2024

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE, BACHELOR OF BUSINESS INFORMATION TECHNOLOGY AND BACHELOR OF INFORMATION TECHNOLOGY**

**SCI 210: Computer graphics**

**DATE: 12TH APRIL, 2024** **TIME: 1.30-3.30 PM**

**INSTRUCTIONS TO CANDIDATES**

a) **Answer ALL questions from Section A(Compulsory)**
b) **Answer ANY TWO questions from Section B**

**SECTION A - Compulsory**

**Question One**

(a) Define the term computer graphics. **(2 marks)**

(b) (i) Explain the difference between image resolution and screen resolution. **(2 marks)**

(ii) With the aid of a diagram, explain the working of shadow mask CRT. **(4 marks)**

(c) (i) With an example in each, explain two classes of computer graphics. **(4 marks)**

(ii) Explain two techniques of representing graphics in computers. **(4 marks)**

(d) With appropriate examples, describe three types of animations **(3 marks)**

(e) Given the line extends from (x1, x1) to (x2, y2), present a simple DDA algorithm. **(3 marks)**

(f) Explain four applications of computer graphics. **(4 marks)**

(g) Write a C/C++ program that would illustrates the combinations of different regular shaped graphical objects. The program should draw a rectangle with points P(5,5), Q(100,100), lines along its diagonals and a circle inside the rectangle of radius 45 pixels with center 52.5,52.5. **(4 marks)**

## SECTION B

***Answer any two questions from this section***

**Question Two**

(a) (i)If a point (x,y) is moved to a point which is at a distance of Tx along x axis, write it's new position. **(2 marks)**

(ii)If a point (x,y) is moved to a point which is at a distance Ty along y axis, write it's new position. **(2 marks)**

(iii)If a point (x,y) is rotated anticlockwise through an angle about the origin, state it's new coordinates. **(2 marks)**

(iv)Write the equation for scaling transformations. **(2 marks)**

(v)Give the matrix formulations for transforming a point (x,y) to (x1, y1) by translation. **(3 marks)**

(vi)Write a C program to rotate a triangle about the origin with vertices at original coordinates (5,10), (5,5), (10,5) by 30 degrees. **(5 marks)**

(b)Suppose we want to shift a triangle with coordinates at A(200,100), B(300,1000 and C(400,700). The shifting to be done by 200 units along x axis and 100 units along y axis. Using the matrix form below, work out the new coordinates of the new triangle.

In the matrix form $[x_2\ y_2\ 1] = [x_1\ y_1\ 1] * \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ Tx & Ty & 1 \end{bmatrix}$

**(4 marks)**

**Question Three**

(a) Explain the role of the following graphics functions found in the graphics.h file.

(i) malloc( );;

(ii) settextstyle( ); **(2 marks)**

(b) (i) Discuss four types of difficulties encountered in displaying pictures.**(4 marks)**

(ii) Fred intends to design a line drawing algorithm for his fourth-year project in computer graphics. Explain **three** qualities of a good line algorithm she should meet. **(3 marks)**

(c) (i) The current computers have incorporated features in order to handle intensive processing of graphics. With the aid of a sketch, describe the storage and display of graphics in these computers. **(5 marks)**

(ii) Write a C program that would draw an ellipse. Use appropriate functions and coordinates. **(6 marks)**

**Question Four**

(a) (i) Define the following terms as used in computer graphics:

I. clipping;

II. windowing.

**(4 marks)**

(ii) Describe the following major graphic file formats.

I. '.jpeg'

II. '.png' **(2 marks)**

(b) Explain four areas of applications of animation in computer graphics. **(4 marks)**

(c) Jane would like to translate and then rotate a 2D graphic. Write the algorithm she could use to achieve her objective. **(4 marks)**

(d) Write a C program that will draw a right-angled triangle with a blue shade. Use appropriate coordinates and functions. **(6 marks)**