INTERNATIONAL UNIVERSITY OF EAST AFRICA
'Learning to Succeed'

FACULTY OF SCIENCE AND TECHNOLOGY

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BSSE

YEAR/SEM: YEAR 4/SEMESTER 2

COURSE CODE: SWE4200

NAME: ADVANCE COMPUTER GRAPHICS

DATE: 2025-04-15

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Attempt All questions in this Section

Question 1:

a) Differentiate between Vector scan display and Raster scan display. (4 marks)
b) Write a program in C to draw following shapes with given points. (8 marks)
i. Line (20,20,60,60)
ii. Circle (100,100,25)
c) Explain the stages of rasterization in OpenGL, including vertex processing, primitive assembly, rasterization, and fragment processing (8 marks)
d) Write the DDA line drawing algorithm. (5 marks)
e) Consider the line from (5, 5) to (13, 9). Use the Bresenhamâ??s algorithm to rasterize this line. (6 marks)
f) Write a program in C to fill polygon using Boundary fill algorithm. (5 marks)
g) Explain graphics pipeline in detail. (4 marks)

Section B Attempt any three Questions from this Section

Question 1:

a) What is the difference between immediate mode and retained mode in OpenGL? (6 Marks)
b) Write an OpenGL code snippet to draw a red triangle using glBegin() and glEnd(). (8 Marks)
c) Explain why immediate mode (e.g., glBegin()) is considered outdated in modern OpenGL. (6 Marks)

Question 2:

a) Describe the 2D Cartesian coordinate system used in OpenGL. (6 Marks)
b) Explain how the glTranslatef() function works and provide an example of its use. (7 Marks)
c) Discuss the effect of applying a translation followed by a rotation on a 2D object. (7 Marks)

Question 3:

a) Explain the purpose of GLUT (OpenGL Utility Toolkit) in an OpenGL program. (6 Marks)
b) Write a simple C/C++ code snippet to initialize an OpenGL window using GLUT. (8 Marks)
c) Describe one common issue beginners face when setting up OpenGL and how to resolve it. (6 Marks)

Question 4:

a) Describe the role of the z-axis in 3D graphics with OpenGL. (6 Marks)
b) Write a code snippet to draw a simple 3D cube using GL_QUADS. (8 Marks)
c) Explain the purpose of enabling depth testing with glEnable(GL_DEPTH_TEST). (6 Marks)

Question 5:

a) What is the purpose of the viewport in OpenGL, and how is it set using glViewport()? (6 Marks)
b) Differentiate between orthographic and perspective projections with examples. (8 Marks)
c) Write a code snippet to set up an orthographic projection for a 2D scene. (6 Marks)

Question 6:

a) List three OpenGL primitives (e.g., GL_POINTS, GL_LINES) and their uses. (6 Marks)
b) Write a code snippet to draw a green line segment from (0,0) to (1,1). (7 Marks)
c) Explain how GL_TRIANGLE_STRIP differs from GL_TRIANGLES in rendering. (7 Marks)