AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES (CEAS)

NCSC 300: COMPUTER GRAPHICS

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2025

LECTURER: MR TIMOTHY MAKAMBWA

TIME: 3 HOURS

INSTRUCTIONS

You are required to answer questions as instructed in each section

Start each question on a new page in your answer booklet

Answer *all* questions in Section A, any *four* from Section B and any *two* from Section C

Section A – (Compulsory 20 Marks)

Attempt **all** parts in brief 2*10 = 20

Question One

a) Differentiate between raster and random scan? [2]
b) What are the properties of Ellipses? [2]
c) What is the difference between computer graphics and image processing? [2]
d) Distinguish between pixel ratio and aspect ratio. [2]
e) What are line attributes? [2]
f) Write the intensity colour codes for a four-level grayscale system. [2]
g) Define Odd-Even rule [2]
h) Explain 2 D translation with diagrams [2]
i) List the properties of Bezier Curves. [2]
j) Define a frame buffer. [2]

Section B

Attempt any ***four (4)*** of the following 4*10 = 40

Question Two

a) Explain shadow mask Cathode Ray Tube (CRT). Give its advantages and disadvantages. [10]
b) Explain 3-dimensional clipping. What are the problems that are encountered in perspective projections? [10]
c) Describe in detail the Digital Differential Analyser (DDA) Algorithm scan conversion [10]
d) Explain the working Cohen-Sutherland clipping algorithm in detail. [10]
e) Draw a simple Illumination model. Include the contribution of Diffuse, Ambient and Specular Reflection. [10]
f) Describe Sutherland-Hodgeman polygon clipping algorithm [10]

Section C

Attempt any two (2) questions from the following 2*20 = 40

Question Three

a) Consider two raster systems with resolutions of 640* 480 and 1280* 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? [10]
b) Consider the line from (5, 5) to (13, 9). Use the Bresenham algorithm to rasterize the line. [10]

Question Four

a) 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). [10]
b) Obtain the mirror reflection of the triangle formed by the vertices A(0, 3), B(2, 0) and C(3, 2) about the line passing through the points (1, 3) and (-1,-1). [10]

Question Five

a) What is window-to-view point coordinate transformation 7 What are issues related to multiple windowing? [10]
b) What do you mean by projection? Differentiate between parallel projection and perspective projection. [10]

Question Six

a) What do you understand by the term "Back-Face Removal"? Explain a Back-Face Removal algorithm, you find convenient to implement. Justify your answer. [10]
b) Explain Z-Buffer algorithm. [10]

END OF EXAMINATION