PAN AFRICA CHRISTIAN UNIVERSITY

Where Leaders are Made

UNIVERSITY EXAMINATIONS: 2025/2026

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

BIT400|BSIT400

COMPUTER GRAPHICS AND ANIMATION

DATE: FRIDAY 31ST JULY 2026 **TIME: 3 HOURS**

INSTRUCTIONS: Question One is Compulsory, Choose Three Other Questions

SECTION A (COMPULSORY)
SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION
QUESTION 1 (15 marks)

a. Consider display technologies for hand-held devices. Explain the principles of operation of each of the following.

   Note: You may illustrate your answers with a diagram.

   (i) Liquid crystal displays (3 marks)

   (ii) Electrophoretic (electronic paper) displays (3 marks)

b. Using the Bresenhams line drawing algorithm scan convert the line starting at point (6,6) and ending at (20,18) (3 marks)

c. Consider three different raster systems with resolutions of 540 x 380, 1080 x 924 and 1560 x 1048. What size is frame buffer (in bytes) for each of these systems to store 12 bits per pixel? (4 Marks)

d) Outline two the disadvantages of OLED computer screens (2 Marks)

QUESTION 2 (15 marks)

a. To display in a computer screen the programmer needs to poke the video memory.

Discuss how memory mapping works (5 Marks)

b. In transformations rotate by 90 degree clockwise an object with the following endpoints (2,2) (3,4) (4,2) (5 Marks)

d. Discuss four main advantages of laser printers? (5 Marks)

QUESTION 3 (15 marks)

a. Explain how the contribution to the overall amount of reflected light is calculated by below methods.

(i) Ambient illumination (2 marks)

(ii) Diffuse reflection (2 marks)

(iii) Specular reflection (2 marks)

b. Discuss the problems associated with the Digital Differential Analyzer line drawing algorithm (5 Marks)

c. Given an object with the endpoints (2,2) (2,4) (4,4) and (4,2) can you reduce the objects size by 50% using the appropriate transformation technique (4 Marks)

QUESTION 4 (15 marks)

a. Using midpoint circle drawing algorithm scan a circle centered on the origin and has a radius of 10 units (9 Marks)

b. In memory mapping, convert the following image into a color bitmap file(use hexadecimal) (6 Marks)

Green	Red	Blue	Blue
Green	Magenta	Yellow	Yellow
Green	Cyan	Yellow	Yellow
Blue	white	Black	Black

QUESTION 5 (15 marks)

a) Given a polygon with the vertices (0,0), (0,1), (1,0) and (1,1). Draw the shape obtained after transforming this unit square with the homogeneous matrix M given below. (5 Marks)

$$\mathbf{M} = \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \cos(90) & -\sin(90) & 0 \\ \sin(90) & \cos(90) & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

b) Rasterize a line having end points (10,20) and (16,25) and plot the resultant pixels using Bresenham's algorithm. (5 Marks)

c) John wants to acquire a graphics display device, explain five factors he needs to consider in the acquisition process. (5 Marks)