CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COMP 420: COMPUTER GRAPHICS

STREAMS: BSC (COMPUTER SCIENCE) Y4S1   **TIME: 2 HOURS**

DAY/DATE: FRIDAY 07/12/2018   **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS:

- **Attempt question ONE in section A and any other two questions in section B**

SECTION A (30 MARKS)-COMPULSORY

QUESTION ONE

a) Using examples, discuss the following transformations: **[6 marks]**

    i.   Reflection

    ii.   Shear mapping

b) Define the following terms: **[8 marks]**

        i.   Computer graphic.

        ii. Scalar.

        iii. Point**.**

        iv. Line.

c) List FOUR input devices of multimedia.   **[4 marks]**

d) Briefly explain the term scan conversion.   **[2 marks]**

e) Define refresh frame buffer.   **[2 marks]**

f) Define the term aliasing and how to prevent it.   **[4 marks]**

g) Differentiate between lossy and lossless compression algorithms. **[4 marks]**

SECTION B: ATTEMPT ANY TWO QUESTIONS (40 MARKS)
QUESTION TWO (20 MARKS)

a) Differentiate between a local illumination model and global illumination model

[4 marks]

b) Draw a line using the digital Differential analyzer line drawing algorithm starting at point (4,4) and ends at point (12,10)   **[8 marks]**

c) Discuss the Cohen- Sutherland line clipping algorithm.   **[8 marks]**

QUESTION THREE (20 MARKS)

a)   Explain the main functions used in OpenGL.

[8 marks]

b)   Explain the meaning of the term parallel projection and explain where it is most applicable.   **[6 marks]**

c)   Find the angle between vectors (3, 7) and (-4, 5).   **[6 marks]**

QUESTION FOUR (20 MARKS)

a)   Differentiate between diffuse reflection and specular reflection.   **[4 marks]**

b)   i) Derive the following Rotation Identity Matrix: **[4 marks]**

$x' = x \cos(\theta) - y \sin(\theta)$

$y' = x \sin(\theta) + y \cos(\theta)$

ii) Find the transformed point, P', caused by rotating P= (3, 2) about the origin Through an angle of 90°.   **[4 marks]**

c)   Using a suitable diagram briefly explain the various components and their functions in a CRT.   **[8 marks]**

QUESTION FIVE (20 MARKS)

a) Explain the following surface detection methods: **[8 marks]**
   i.   Z-Buffer Method
   ii. Binary Space Partitioning(BSP) Tree Method

b) Draw a circle centered at point (5,5) and has a radius of 6 units using the polar coordinates method   **[6 Marks]**

c) Assuming that a certain full-color (24 bit per pixel) RGB raster system has a 512 by 512 frame buffer, how many distinct color choices (intensity levels) would be available?   **[6 marks]**