



NATIONAL OPEN UNIVERSITY OF NIGERIA

Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi, Abuja-Nigeria

FACULTY OF SCIENCE Department of Computer Science 2024 1 EXAMINATION

COURSE TITLE: **Computer Graphics**

COURSE CODE: **CIT371**

CREDIT UNIT: **3**

TIME: **2 Hours 30 Minutes.**

INSTRUCTIONS: **Answer questions 1 and any other 3 questions. Question 1 is compulsory.**

1. (a) What is meant by points and vectors defined in terms of a coordinate frame.
1. (b) List and briefly describe two mathematical areas of background knowledge that are essential for computer graphics.
1. (c) Explain how a mathematical background in geometry and algebra contribute to success in the field of computer graphics
25 Marks
2. (a) Explain in your own words what is meant by the term "rendering".
2. (b) List and briefly describe three coordinate systems that are used in the graphics pipeline.
2. (c) Why is it important to keep the coordinate systems straight in rendering?
15 Marks
3. (a) Outline two main uses of BSP trees
3. (b) Briefly summarize when BSP trees are useful and where they are not useful.
3. (c) Explain how back-to-front ordering of facets is performed using a BSP tree
15 Marks
4. (a) Briefly describe the method used to define the CIE XYZ colour space.
4. (b) Explain the concept of the CIE chromaticity diagram and how it is produced from the XYZ colour space.
4. (c) Explain why there is a problem with the R, G, B mixing coefficients when trying to achieve a colour match and how it is addressed by the CIE.
15 Marks
5. (a) Explain how to represent a straight line given two points (x_0, y_0) and (x_1, y_1) .
5. (b) Determine the equations for calculating the slope (m) and y -intercept (b) of the line.
5. (c) Describe how to represent a line segment of length L using a start point (x_0, y_0) , direction vector v , and scalar k . What are the constraints on the value of k ?
15 Marks
6. (a) Explain two approaches for drawing a circle in a digital image: polygonal approximation and the midpoint circle algorithm. What are the advantages and disadvantages of each?
6. (b) Describe how the midpoint circle algorithm determines whether the next pixel along a region of the circle should be on the same row or the row above.
6. (c) Explain what the midpoint test checks.
15 Marks