UNIVERSITY OF MORATUWA
Faculty of Information Technology

017

B.Sc. in Information Technology
Level 2 – Semester 2 Examination
IT 2602 – Computer Graphics

Time Allowed: 3 hours | June 2010

INSTRUCTIONS TO CANDIDATES

1. This paper contains 4 questions on 3 Pages.
2. The total marks obtainable for this examination is 100. The marks assigned for each question & sections there of are included in square brackets.
3. This examination accounts for 70% of the module assessment.
4. This is a close book examination.
5. Answer ALL questions.

ADDITIONAL MATERIAL

None

Continued...

Question 1

(a) Name the main representations of graphics? Write two characteristics for each representation.

[5 Marks]

(b) Explain the importance of the frame buffer and illustrate the relationship between the frame buffer and the color lookup table using suitable diagrams.

[4 Marks]

(c) Briefly explain three main differences between Liquid Crystal Displays and Cathode Ray Tubes.

[6 Marks]

(d) Name and explain the main steps of the traditional graphics pipeline

[10 Marks]

Question 2

(a) Construct the Bresenham's midpoint algorithm for $0< m<1$ (m=slope of the line). (Clearly indicate the steps and the dicision you take using appropriate diagrams)

[10 Marks]

(b) A straight line goes through points (3,2) and (15, 6). Calculate the pixels between the given points using the midpoint algorithm.

[6 Marks]

(c) Briefly explain the process of viewport mapping using appropriate diagrams.

[4 Marks]

Question 3

(a) Briefly explain the four main possible scenarios in Sutherland-Hodgman Polygon Clipping algorithm.

[5 Marks]

(b) The polygon ABCDEFA has the following coordinates.
A:(-4,-2)
B: (4, -2)
C: (4, 1)
D: (1,4)
E: (-1,4)
F: (-4, 1)

The world window WXYZ has the following coordinates
W: (3,3)
X: (-5,3)
Y: (-5,-3)
Z: (3,-3)

(i) Illustrate the scenario of the world window and the polygon using appropriate diagrams
(ii) Clip the polygon using the Sutherland-Hodgman Polygon Clipping algorithm. (Hint: inputs and outputs for each edge should be clear as well as the vertices)

[10 Marks]

(c) Assuming the graphic designer needs to show the entire polygon in section (b) using the world window but with the following conditions

- Change the size or the location of the polygon
- Cannot change the orientation of the polygon
- Get an acceptable usage of the world window,

(i) Suggest the types of transformations can be used to visualize the polygon
(ii) Build up the function needed for the necessary transformations
(iii) Show your calculation related the transformations and the final coordinates of the polygon

[15 Marks]

Question 4

(a) Explain the ways of determining the interior and exterior pixels in basic polygon filling algorithms

[4 Marks]

(b) What are the major types of geometrical projections which are used in computer graphics? Write an advantage and a disadvantage for each type.

[6 Marks]

(c) What types of lighting contributions are considered in the local illumination model? Explain each type using suitable diagrams.

[8 Marks]

(d) Explain the main stages of building a hierarchical model and specify the importance when it comes to transformations.

[7 Marks]

End of Paper