



UNIVERSITY OF MORATUWA
Faculty of Information Technology

BSc. (Hons.) in Information Technology
and
BSc. (Hons.) in Information Technology & Management
Level 2 – Semester 2 Examination
IN 2600 – COMPUTER GRAPHICS AND ANIMATION

Time Allowed: 3 hours

October 2019

INSTRUCTIONS TO CANDIDATES

1. This paper contains 5 questions on 4 Pages including this front page.
2. The total marks obtainable for this examination is 100. The marks assigned for each question & sections thereof are included in square brackets.
3. This examination accounts for 60% of the module assessment.
4. This is a close book examination.
5. Non-programmable scientific calculators are allowed
6. Answer **ALL** questions.

ADDITIONAL MATERIAL

None.

Continued...

[Total Marks allocated: 100 Marks]

Question 1

- (a) What is meant by colour depth of an image?

[4 Marks]

- (b) Briefly describe the properties and components of CYMK colour model with its application usage.

[4 Marks]

- (c) What is meant by colour gamunt?

[4 Marks]

- (d) Why RGB colour model is said to be a correlated colour model?

[4 Marks]

- (e) Calculate the storage space required (without any compression) to save an image with 640 x 320 resolution and RGB True colour model.

[4 Marks]

Question 2

- (a) Describe the advantages of Bresenhams' line drawing algorithm.

[4 Marks]

- (b) Write the algorithmic steps of Bresenhams' line drawing algorithm with necessary conditional logic.

[8 Marks]

- (c) Calculate the first four points of a line drawn in between (-1, 2), (7, 7) using Bresenhams' line drawing algorithm. State your assumptions if any.

[8 Marks]

Question 3

- (a) Derive an expression for a pixel on an object after performing a rotation (θ^0 angle) transformation related to the center of the object (x_c, y_c). Represent your expression in homogeneous matrix form.

[8 Marks]

Continued ...

- (b) A circle with a center (2, 3) has a pixel P (6, 5) on its circumference. This circle has rotated by an angle of 60° about its center and then translated by (2, 3) relative to its center. Find the new coordinates of point P.

[8 Marks]

- (c) Write the four-neighborhood boundary fill algorithm using an illustration.

[4 marks]

Question 4

- (a) Describe the 3D Graphics viewing pipeline with its stages and operations.

[4 Marks]

- (b) Describe the nature of 3D volume generated in two basic projections of 3D Graphics.

[4 Marks]

- (c) Write an expression to obtain a location of a point after performing a 3D scaling with respect to the coordinates origin.

[4 Marks]

- (d) A point on a 3D object is described by P (5, 4, 12) and coordinates' origin is at the center of the object. If the object is scaled with a scaling vector of (2, 1.5, 0.5), find the new location of the P.

[8 Marks]

Question 5

- (a) Describe the Cohen-Sutherland's out code clipping algorithm using a diagram.

[4 Marks]

- (b) If a window has been defined by (4,3) and (16,11), write down the trivial acceptance, trivial rejection and petitioning case out of the following lines when using Cohen-Sutherland's out code clipping algorithm.

- (i) Line from (5,5) to (9,10)
- (ii) Line from (1,4) to (3,10)
- (iii) Line from (1,1) to (7,7)
- (iv) Line from (6,5) to (12, 7)

[4 Marks]

Continued ...

- (c) Describe the advantages of parametric representation of curves in computer graphics.
[4 Marks]
- (d) How depth cueing is used to show depth information in 3D graphics?
[4 Marks]
- (e) Briefly describe the properties of diffuse reflection on Lambertian surfaces.
[4 Marks]

End of Paper