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S.E. (Comp. Engg.) (II Sem.) EXAMINATION, 2010

COMPUTER GRAPHICS

(2003 COURSE)

Time : Three Hours

Maximum Marks : 100

N.B. :— (i) Neat diagrams must be drawn wherever necessary.

(ii) Assume suitable data, if necessary.

(iii) Answer *three* questions from Section I and *three* questions from Section II.

(iv) Figures to the right indicate full marks.

SECTION I

1. (a) Describe Bresenham's line drawing algorithm. Explain sharp slope and gentle slope situations. [6]

(b) Explain the following character generation methods in detail :

(i) Bitmap method

(ii) Stroke method

(iii) Starburst method. [8]

(c) Define :

(i) Vectors

(ii) Pixels. [4]

P.T.O.

Or

2. (a) Explain the features of the following :

(i) Scanner

(ii) Touch panels

(iii) Joysticks.

[6]

(b) Using DDA algorithm, find out which pixels would be turn on for the line with end points as $[-1, -2]$ to $[4, 8]$.

[6]

(c) Write a short note on :

"Text styles and line style."

[4]

3. (a) State the characteristics of scan line polygon filling algorithm and compare it with boundary fill algorithm.

[8]

(b) Discuss the merits and demerits of real time scan conversion and run length encoding.

[8]

Or

4. (a) Show that two-dimensional scaling and rotation do not commute in general.

[8]

(b) What are the different types of polygon ? How to find whether given point is inside the polygon or not ?

[8]

5. (a) Explain Cohen-Sutherland outcode algorithm with the help of suitable example. [8]
- (b) How is segmentation concept used in animation ? Explain by taking example. [8]

Or

6. (a) Explain segment table structure and the various data structures used to implement the segment table. [8]
- (b) Explain Sutherland-Hodgman algorithm in detail. [8]

SECTION II

7. (a) Explain :
- (i) Perspective projection.
- (ii) Parallel projection. [10]
- (b) Explain all the possible 3D transformations along with the rotation about an arbitrary axis. [8]

Or

8. (a) What is the necessity of 3D clipping algorithm ? Explain midpoint subdivision algorithm for 3D clipping. [10]
- (b) A cube is defined by 8 vertices :

A(0, 0, 0), B(2, 0, 0), C(2, 2, 0), D(0, 2, 0), E(0, 0, 2), F(0, 2, 2), G(2, 0, 2), H(2, 2, 2)

Perform the following transformations on the above cube :

- (i) Translation ($t_x = 2$, $t_y = 4$, $t_z = 0$)
- (ii) Scaling ($s_x = 0.5$, $s_y = 1$, $s_z = 1$)
- (iii) Reflection about planes. [8]

9. (a) Explain the necessity of hidden surface algorithms. How does back face removal algorithm determine which surface is to be removed ? [8]

(b) Write short notes on :

(i) RGB colour model

(ii) HSV colour model. [8]

Or

10. (a) What is shading ? What steps are required to shade an object using Gouraud shading algorithm ? [8]

(b) Write short notes on :

(i) Ray tracing

(ii) Transparency. [8]

11. (a) Compare Bezier and B-spline curves. [8]

(b) What is fractal dimension ? Explain Koch curve in detail, giving fractal dimension. [8]

Or

12. (a) What is interpolation ? Explain Lagrangian interpolation method. [8]

(b) Explain how fractal line algorithm can be used for generating fractal surface. [8]