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**Question Paper Code : 31319**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Computer Science and Engineering

CS 2401/CS 71/10144 CS 702 — COMPUTER GRAPHICS

(Common to Information Technology)

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Digitize a line from (10, 12) to (15, 15) on a raster screen using Bresenham's straight line algorithm.
2. List the different types of text clipping methods available.
3. Give the general expression of Bezier Bernstein polynomial.
4. Give the single-point perspective projection transformation matrix when projectors are placed on the z-axis.
5. List any four real-time animation techniques.
6. How are mouse data sent to an OpenGL application?
7. Which shading method is faster and easier to calculate? Why?
8. What are the types of reflection of incident light?
9. Where does the ray  $r(t) = (4, 1, 3) + (-3, -5, -3)t$  hit the generic plane?
10. How objects are modelled using constructive solid geometry technique?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Calculate the pixel location approximating the first octant of a circle having centre at (4, 5) and radius 4 units using Bresenham's algorithm. (8)
- (ii) Discuss in brief: Antialiasing techniques. (8)

Or

- (b) (i) A polygon has four vertices located at A(20, 10) B(60, 10) C(60, 30) D(20, 30). Calculate the vertices after applying a transformation matrix to double the size of polygon with point A located on the same place. (8)
- (ii) The reflection along the line  $y = x$  is equivalent to the reflection along the X axis followed by counter clockwise rotation by  $\theta$  degrees. Find the value of  $\theta$ . (8)
12. (a) (i) A cube has its vertices located at A(0, 0, 10), B(10, 0, 10), C(10, 10, 10), D(0, 10, 10), E(0, 0, 0), F(10, 0, 0), G(10, 10, 0), H(0, 10, 0). The Y axis is vertical and Z axis is oriented towards the viewer. The cube is being viewed from point (0, 20, 80). Calculate the perspective view of the cube on XY plane. (8)
- (ii) Discuss on the various visualization techniques in detail. (8)

Or

- (b) (i) Calculate the new coordinates of a block rotated about x axis by an angle of  $= 30$  degrees. The original coordinates of the block are given relative to the global xyz axis system.  
A(1, 1, 2) B(2, 1, 2) C(2, 2, 2) D(1, 2, 2) E(1, 1, 1) F(2, 1, 1) G(2, 2, 1) H(1, 2, 1). (8)
- (ii) Discuss on Area subdivision method of hidden surface identification algorithm. (8)
13. (a) Discuss on the various colour models in detail. (16)

Or

- (b) Discuss on the methods used in OpenGL for handling a window and also write a simple program to display a window on the screen. (16)
14. (a) Discuss on the process of adding textures to faces of real objects. (16)

Or

- (b) Compare Flat shading and Smooth shading with respect to their characteristics and types. (16)

15. (a) (i) Discuss the Ray tracing process with an example. (8)  
(ii) Explain how refraction of light in a transparent object changes the view of the three dimensional object. (8)

Or

- (b) Write short notes on :
- (i) Mandelbrot sets. (5)
  - (ii) Fractal geometry. (5)
  - (iii) Boolean operations on objects. (6)

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