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Question Paper Code : 73395

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Computer Science and Engineering

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

(Common to Information Technology)

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Rasterize the line A (0,0) B (6,7) using DDA line drawing algorithm.
2. Calculate the new position vector by applying a translation in the xyz direction by -2, -4 and -6 respectively on the homogenous coordinate position vector [1,6,4].
3. Differentiate parallel and perspective projections.
4. List the characteristics of approximation curves.
5. How are shades, tints and tones of colours produced?
6. Give the structure of an OpenGL program.
7. List the steps followed in volume rendering.
8. Define diffuse reflection.
9. How are Mandelbrot sets created?
10. Write an overview of a ray tracing process.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Given a clipping window A(20,20) B(60,20) C(60,40) D(20,40). Using Sutherland Cohen algorithm find the visible portion of the line segment joining the points P(40,80) Q(120,30). (8)
- (ii) Consider a triangle ABC having coordinates $A = [4 \ 1]$ $B = [5 \ 2]$ $C = [4 \ 3]$. Rotate it by an angle 90 degrees about point A. Give the coordinates of the rotated triangle. (8)

Or

- (b) (i) Consider a line AD with coordinates A(1,1) and B(10,10). Reflect the line about Y axis and then about the line $Y = -X$. Let this be case 1. In case 2 simply rotate the line by -270 degrees. Prove that the transformed object in both the cases is same. (8)
- (ii) Explain the attributes of output primitives in detail. (8)
12. (a) (i) Explain depth buffer algorithm for hidden surface removal in three dimensional objects. (8)
- (ii) Discuss on the general characteristics of B Spline curves in detail. (8)

Or

- (b) (i) Discuss on different types of data visualization in detail. (8)
- (ii) Determine the projected image on the xy plane of a tetrahedron
- $$ABCD = \begin{matrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{matrix}$$
- using standard single point perspective

transformation. The distance of the vanishing point P on the view plane may be taken as 5 units. (8)

13. (a) Explain the OPENGL primitives with program structure for opening a window for drawing in detail. (16)

Or

- (b) Discuss on the various animation techniques in detail with example for each. (16)
14. (a) (i) Which shading model do you use to render shiny plastic or glass objects? Why? (8)
- (ii) How can you improve the realism of objects using reflection mapping technique? (8)

Or

- (b) Discuss on the various techniques of adding shadows to objects. (16)

15. (a) (i) Compare and contrast ray tracing and ray casting. (8)
(ii) Explain the process of adding image texture onto surfaces. (8)

Or

- (b) Write short notes on :
- (i) Data structures for Boolean objects (5)
 - (ii) Self similarity in fractals (5)
 - (iii) Refraction of light. (6)
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