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10CS65

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022

**Computer Graphics and Visualization**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting at least TWO questions from each part.*

**PART – A**

- 1 a. With a neat diagram, explain the major components of a graphics system. List the applications of the same. (10 Marks)
- b. What is the advantage of pipeline architecture? Explain the major steps of graphics pipeline architecture. (10 Marks)
- 2 a. With necessary sketches, explain the different coloring models. (10 Marks)
- b. Write an OpenGL program to generate, 3-dimensional Sierpinski Gasket with suitable comment lines. (10 Marks)
- 3 a. Write an OpenGL program to draw a red colored small box at each location on the screen, where the mouse cursor is located at the time that the left button is pressed. Use the middle button to terminate the program. (10 Marks)
- b. With OpenGL code, explain how to draw erasable lines and rubber band lines. (10 Marks)
- 4 a. Write an OpenGL interactive program to rotate a color cube about the principle axis. (12 Marks)
- b. Explain different frames in OpenGL. (08 Marks)

**PART – B**

- 5 a. Describe the basic 3D transformations with their matrix representations in homogeneous coordinate system along with their inverses. (12 Marks)
- b. Derive the matrix for rotation about a fixed point in 3D over Z-axis. (08 Marks)
- 6 a. With suitable examples, explain the syntax of OpenGL functions for orthographic and perspective projections in 2D and 3D. (08 Marks)
- b. Differentiate between orthographic projection and perspective projection. (04 Marks)
- c. Deduce the matrix for perspective projection. (08 Marks)
- 7 a. Briefly explain the different light sources. (06 Marks)
- b. Describe the concept of Phong lighting model. (06 Marks)
- c. Explain the different types of polygonal shading techniques. (08 Marks)
- 8 a. With necessary derivations, explain the Bresenham's line generation algorithm. Also mention the advantage of this over DDA algorithm. (10 Marks)
- b. Write short notes on:
  - (i) Z-buffer algorithm
  - (ii) Sutherland-Hodgeman polygon clipping (10 Marks)

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