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Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025 Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is DDA? With the help of a suitable example demonstrate the working principle of Bresenham's Line drawing algorithm for different slopes of a line. (10 Marks)
- b. With a neat diagram, explain the basic design and operation of Cathode Ray tube. (10 Marks)

OR

- 2 a. Explain with diagram the different Cartesian reference frames are used in the process of constructing and displaying a scene. (10 Marks)
- b. With a neat diagram, explain the architecture of a raster display system with integrated display processor. (10 Marks)

Module-2

- 3 a. Give the reason to convert transformation matrix to homogeneous co-ordinate representation and show the process of conversion. Shear the polygon A(2, 2), B(4, 2), C(4, 4), D(3, 5), E(2, 4) along X-axis with a shearing factor of 0.2 (10 Marks)
- b. Explain General scan line polygon fill algorithm support your claim with a neat diagram. (10 Marks)

OR

- 4 a. Explain with example any two algorithms used to identify the interior area of a polygon. (10 Marks)
- b. Develop composite homogenous transformation matrix to rotate an object with respect to a pivot point. For the triangle A(3, 2), B(6, 2), C(6, 6) rotate it in anticlockwise direction by 90° degree keeping A(3, 2) fixed, draw the new polygon. (10 Marks)

Module-3

- 5 a. Explain basic illumination models. (10 Marks)
- b. Obtain the matrix representation for rotation of a object about an arbitrary axis. (10 Marks)

OR

- 6 a. Explain RGB and CMY color models with examples. Explain the transformation between CMY and RGB color spaces. (10 Marks)
- b. Explain Cohen Sutherland line clipping Algorithm clip. The lines with coordinates, $(X_0, Y_0) = (60, 20)$, $(X_1, Y_1) = (80, 120)$, given the window boundaries, $(X_{wmin}, Y_{wmin}) = (50, 50)$ and $(X_{wmax}, Y_{wmax}) = (100, 100)$ (10 Marks)

Module-4

- 7 a. Explain 2 classifications of visible surface detection algorithm. (05 Marks)
- b. Compare perspective and parallel projection. (05 Marks)
- c. What is 3D viewing? With the help of block diagram, explain 3D viewing pipeline architecture. (10 Marks)

OR

- 8 a. Design the transformation matrix for perspective projection and give OpenGL 3D viewing function. (10 Marks)
b. Explain perspective projections with reference point and vanishing point with neat diagram. (10 Marks)

Module-5

- 9 a. List the properties of Bezier curve and also explain Bazier techniques of generating curves. (10 Marks)
b. Explain Request, sample and event input modes with block diagram. (10 Marks)

OR

- 10 a. With the help of a suitable programming construct, explain event driven input menu picking and building interactive models. (10 Marks)
b. With the role of glCallList() function in creating DisplayLists in OpenGL. Write OpenGL code for rendering a Simple Animated face. (10 Marks)

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