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18CS62

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. List and explain any 6 applications of computer graphics.   **(06 Marks)**
    b. Describe the basic structure of an OpenGL graphics program with the necessary OpenGL functions.   **(06 Marks)**
    c. Digitize the line by using Bresenham's line drawing algorithm with end points (−2, 5) and (5, 12). List the drawbacks of DDA line drawing algorithm.   **(08 Marks)**

OR

2   a. Compare and contrast Raster and Random-scan displays with suitable figure.   **(06 Marks)**
    b. Explain the coordinate reference frames. How is a 2D world coordinate reference frame specified using OpneGL?   **(06 Marks)**
    c. Explain the Bresenham's circle generation algorithm using suitable examples.   **(08 Marks)**

Module-2

3   a. Explain the General Scan line polygon fill algorithm.   **(08 Marks)**
    b. Scale the given triangle A(3, 2), B(6, 2), C(6, 6) using the scaling factors $S_x = \dfrac{1}{3}$, $S_y = \dfrac{1}{2}$ about the point A(3, 2). Draw the original and the scaled object.   **(06 Marks)**
    c. Explain shear and reflection transformation technique.   **(06 Marks)**

OR

4   a. Explain the two commonly used algorithm for identifying the interior areas of an object.
                                                                                    (08 Marks)
    b. Develop a composite homogenous transformation matrix to rotate an object with respect to a pivot point.   **(06 Marks)**
    c. Explain the 2D viewing pipeline.   **(06 Marks)**

Module-3

5   a. Explain the working of Cohen-Sutherland line clipping algorithm.   **(06 Marks)**
    b. Demonstrate 2D normalization and window to viewport transformation using appropriate matrices.   **(08 Marks)**
    c. Explain RGB and CMY color models.   **(06 Marks)**

OR

6   a. Explain Sutherland-Hodgeman polygon clipping algorithm with suitable example. **(08 Marks)**
    b. Explain rotation of a 3D object about an axis parallel to one of the coordinate axis. **(06 Marks)**
    c. Explain specular reflection and the Phong model.   **(06 Marks)**

Module-4

7   a. Explain transformation from world to view coordinate system.   **(04 Marks)**
    b. Explain the orthogonal projection in detail.   **(08 Marks)**
    c. Explain the depth-buffer algorithm.   **(08 Marks)**

OR

8 a. List the 3D viewing coordinate parameters and explain. **(06 Marks)**
   b. Derive the general-perspective transformation equation and explain the special cases of perspective projection equation. **(08 Marks)**
   c. Explain the OpenGL visibility detection functions. **(06 Marks)**

Module-5

9 a. Explain Request, Sample and Event mode with suitable diagram. **(06 Marks)**
   b. Explain Bezia Spline curves and list the properties of Bezier curves. **(08 Marks)**
   c. What is a display list? Explain how a display list is defined and executed in OpenGL. **(06 Marks)**

OR

10 a. Define double buffering. Explain how double buffering is implemented in OpenGL. **(04 Marks)**
   b. Explain Quadric and Curved Surfaces with necessary OpenGL functions. **(08 Marks)**
   c. Explain Menu creation in OpenGL. Write an interactive OpenGL program to display a square when the left button is pressed and to exit the program if right button is pressed. **(08 Marks)**

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