CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   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 $S_x = \frac{1}{3}$, $S_y = \frac{1}{2}$ 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)

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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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