USN ☐☐☐☐☐☐☐☐☐☐ 15CS62

Sixth Semester B.E. Degree Examination, June/July 2019
Computer Graphics and Visualization

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a.   Compare random scan display with rester scan display and list the applications of computer graphics. **(04 Marks)**

    b.   What is openGL? With the help of block diagram explain Library organization of openGL program and give the general structure of openGL program. **(04 Marks)**

    c.   What is DDA? With the help of a suitable example demonstrate the working principle of Breseham's Line drawing algorithm for different slopes of a line. **(08 Marks)**

OR

2   a.   Define the following terms with respect to computer graphics.
      i) Bitmap   ii) Pixmap   iii) aspect ratio   iv) Frame buffer **(04 Marks)**

    b.   List and explain various openGL primitive and its attribute functions. Develop an openGL program to create human face like structure using suitable openGL primitive functions. **(06 Marks)**

    c.   With the help of a suitable example demonstrate Bresenham's circle drwing algorithm. **(06 Marks)**

Module-2

3   a.   Explain scan line polygon fill algorithm. Determine the content of the active edge table to fill the polygon with vertices A(2, 4), B(4, 6) and C(4, 1) for y = 1 to y = 6. **(06 Marks)**

    b.   Develop composite homogeneous 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. **(06 Marks)**

    c.   With the help of a diagram explain shearing and reflection transformation technique. **(04 Marks)**

OR

4   a.   Explain the data structures used by scan line polygon fill algorithm. Determine the content of active edge table to fill the polygon with vertices A(2, 4), B(2, 7), C(4, 9) and D(4, 6). **(06 Marks)**

    b.   Give the reason to convert transformation matrix to homogeneous co-ordinate representation and show the process of conversion. Shear the polygon A(1, 1), B(3, 1), C(3, 3) D(2, 4), E(1, 3) along x-axis with a shearing factor of 0.2. **(06 Marks)**

    c.   i) Prove that two successive 2D rotation are additive
      ii) Prove that successive scaling are multiplicative. **(04 Marks)**

Module-3

5   a.   Design a transformation matrix for window to viewport transformation. And explain how reshape function (glutReshapeFunc) works in openGL programming. **(05 Marks)**

    b.   With the help of a suitable diagram explain basic 3D Geometric transformation techniques and give the transformation matrix. Explain the meaning of affine transformation. **(05 Marks)**

    c.   With the help of openGL statements and diagram explain illumination and shading models. **(06 Marks)**

OR

6 a. What is Clipping? With the help of a suitable example explain cohen Southerland line clipping algorithm. (06 Marks)

b. Design transformation matrix to rotate an 3D object about an axis that is parallel to one of the co-ordinate axes. (06 Marks)

c. With the help of a suitable diagram, explain basic illumination, RGB and CMY colour models. (04 Marks)

Module-4

7 a. What is 3D viewing? With the help of a block diagram, explain 3D viewing pipline architecture. (04 Marks)

b. Design the transformation matrix for orthogonal and perspective projections. (06 Marks)

c. Explain Depth buffer method and give the openGL visibility detection functions. (06 Marks)

OR

8 a. Explain the steps for transformation from world to viewing coordinate system. (04 Marks)

b. Design the transformation matrix for perspective projection and give openGL 3D viewing functions. (06 Marks)

c. Give the general classification of visible detection algorithm and explain any one algorithm in detail. (06 Marks)

Module-5

9 a. With the help of a suitable programming construct explain event driven input menu picking and Building interactive models. (08 Marks)

b. Write a short notes on (any two)
   i) Curve and Quadric surfaces
   ii) openGL curve and surface functions
   iii) Bezier curve and surfaces. (08 Marks)

OR

10 a. What are display lists? Explain the steps to develop interactive models and animating interactive programs. (08 Marks)

b. Write a short note on (any two)
   i) Logic operations (graphics)
   ii) Input devices or clients and servers
   iii) Bezier spline curve and openGL curve functions. (08 Marks)

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