15CS62

Sixth Semester B.E. Degree Examination, Aug./Sept.2020
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. List and explain any six application of computer graphics. (06 Marks)
   b. Explain Refresh Cathod Ray Tube with diagram. (10 Marks)

OR

2. a. Develop Bresenhams line drawing algorithm. (05 Mar[ks])
   b. Write circle drawing algorithm. Given circle radius r = 10, solve the midpoint circ[le] algorithm by determining positions along the circle octant in the first quadrant from x = 0 to x = y. (11 Marks)

Module-2

3. a. Classify the polygons and describe fill area primitives with diagrams. (08 Marks)
   b. Describe about Inside-Outside Tests. (08 Marks)

OR

4. a. Explain General Scan Line Polygon fill algorithm. (08 Marks)
   b. Describe any two of dimensional composite transformation
      i) 2D translation   ii) 2D fixed point scaling. (08 Marks)

Module-3

5. a. Describe 3D translation and scaling. (08 Marks)
   b. Explain window to viewport transformation. (08 Marks)

OR

6. a. Discuss the Cohen Sutherland line clipping with program. (10 Marks)
   b. Explain RGB color model. (06 Marks)

Module-4

7. a. Explain Orthogonal Projections. (10 Marks)
   b. Discuss the OpenGL visibility Detection functions. (06 Marks)

OR

8. a. Explain the Perspective projections. (06 Marks)
   b. Discuss the Depth buffer method. (10 Marks)

Module-5

9. a. Describe the Menus with program. (06 Marks)
   b. What is the necessity of programming event driven input? Describe window events and keyboard event. (10 Marks)

OR

10. a. Explain Rotating square in Animating interactive programs. (07 Marks)
    b. Write short notes on Bezier surfaces. (09 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Describe various applications of computer graphics with appropriate examples. **(08 Marks)**
   b. With a neat diagram, explain the architecture of a raster display system with integrated display processor. **(08 Marks)**

OR

2 a. With necessary steps explain Bresenham's line drawing algorithm. Consider the line from (5, 5) to (13, 9), use the Bresenham's algorithm to rasterize the line. **(08 Marks)**
   b. Explain with diagram the different Cartesian reference frames are used in the process of constructing and displaying a scene. **(08 Marks)**

Module-2

3 a. Explain with example any two algorithms used for to identify the interior area of a polygon. **(06 Marks)**
   b. Explain with illustrations the basic 2-dimension geometric transformations used in computer graphics. **(06 Marks)**
   c. Explain the different Open GL routines used for manipulating display window. **(04 Marks)**

OR

4 a. Explain the scan line polygon filling algorithm. And also explain the use of sorted edge table and active edge list. **(08 Marks)**
   b. What is the need of homogeneous coordinates? Give 2-dimension homogeneous coordinate matrix for translation, rotation and scaling. **(04 Marks)**
   c. Obtain a matrix representation for rotation of a object about a specified pivot point in 2-dimension. **(04 Marks)**

Module-3

5 a. What is clipping? Explain with example the Sutherland-Hodgman polygon clipping algorithm. **(08 Marks)**
   b. Explain basic illumination models. **(08 Marks)**

OR

6 a. Explain RGB and CMY color models with examples. Explain the transformation between CMY and RGB color spaces. **(08 Marks)**
   b. Obtain the matrix representation for rotation of a object about an arbitrary axis. **(08 Marks)**

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Module-4

7 a. Explain the 2 classifications of visible surface detection algorithm. (04 Marks)
   b. Explain with example the depth buffer algorithm used for visible surface detection. And also list the advantages and disadvantages of depth buffer algorithm. (07 Marks)
   c. Bring out the differences between perspective and parallel projections. (05 Marks)

OR

8 a. Explain the OpenGL 3-dimensional viewing functions. (06 Marks)
   b. What is projection reference point? Obtain the general and special case perspective transformation equations. (06 Marks)
   c. Explain Back-face detection method with example. (04 Marks)

Module-5

9 a. Explain the logical classifications of input devices with examples. (06 Marks)
   b. Discuss request mode, sample mode and event mode with figures. (06 Marks)
   c. List the various features that a good interactive program should include. (04 Marks)

OR

10 a. Explain how an event driven input can be performed for a keyboard and mouse device. (06 Marks)
    b. List the properties of Bezier curve. And also explain Bazier techniques of generating curves. (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2018/Jan.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. What is Computer Graphics? Explain the applications of computer graphics. (05 Marks)
   b. Illustrate the sequence of coordinate transformations from modeling coordinates to device-coordinates. (05 Marks)
   c. Explain DDA line drawing algorithm with procedure. (06 Marks)

OR

2 a. Explain the basic operation of CRT with its primary components with neat diagram. (08 Marks)
   b. Digitize the line by using Bresenham's line drawing algorithm with end-points (20, 10) and (30, 18), having slope 0.8. (08 Marks)

Module-2

3 a. How do you classify the polygon? Explain OpenGL polygon fill primitives. (07 Marks)
   b. Explain translation, scaling, rotation in 2D homogeneous coordinate system with matrix representations. (09 Marks)

OR

4 a. Explain general scan-line polygon fill algorithm in detail. (10 Marks)
   b. What are the entities required to perform a rotation? Show that two successive rotations are additive. (06 Marks)

Module-3

5 a. Define clipping. Briefly explain Co-hen Suterland line clipping without code. Discuss four cases. (10 Marks)
   b. Describe phong lighting model. (06 Marks)

OR

6 a. Clip the polygon given in Fig.Q.6(a), using Suterland Hodgman polygon clipping algorithm with neat sketches. (06 Marks)
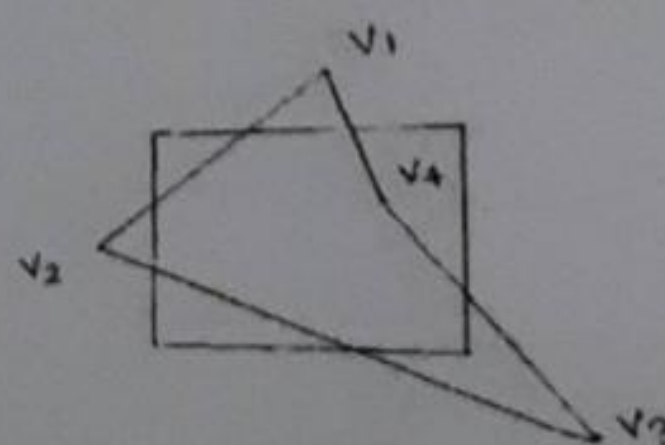

Fig.Q.6(a)

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b. Explain the different types of light sources supported by OpenGL.   (06 Marks)
c. Explain the RGB and CMY color models.   (04 Marks)

Module-4

7 a. Explain the perspective projections with reference point and vanishing point with neat
      diagrams.   (10 Marks)
   b. Discuss depth-buffer method with algorithm.   (06 Marks)

OR

8 a. Demonstrate how transformation from world coordinates to viewing coordinates with matrix
      representation.   (06 Marks)
   b. Explain orthogonal projections in detail.   (10 Marks)

Module-5

9 a. Explain the major characteristics that describe the logical behaviour of an input device.
      Explain how OpenGL provides the functionality of each of the classed of logical input
      devices.   (08 Marks)
   b. Describe the logical input operation of picking in selection mode.   (04 Marks)
   c. What is DisplayList? Write OpenGL code-segment that generate a blue colored square using
      display list.   (04 Marks)

OR

10 a. Explain Bezier spline curves with equations and demonstrate the appearance of Bezier
       curves for various selection of control points.   (08 Marks)
    b. What is double buffering? How it is implemented in OpenGL.   (04 Marks)
    c. Differentiate event mode with request mode.   (04 Marks)

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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)**

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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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Sixth Semester B.E. Degree Examination, June/July 2018
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. With neat diagram, explain the basic design and operation of cathode Ray tube. **(08 Marks)**
   b. Write Bresenham's line drawing Algorithm for $|m| < 1.0$. Digitize the line with endpoints (20, 10) and (30, 18). **(08 Marks)**

OR

2. a. Briefly explain Raster and Random scan displays based on Television Technology. **(08 Marks)**
   b. Write Midpoint Circle Algorithm. Given a circle with radius $r = 10$ demonstrate the midpoint circle algorithm by determining positions along circle octant in first Quadrant from $x = 0$ to $x = y$ (Assume Circle Centre is positioned at origin). **(08 Marks)**

Module-2

3. a. With neat diagram, explain the two commonly used algorithms for indentifying interior areas of a plane figure. **(08 Marks)**
   b. Explain general two dimensional pivot point rotation and derive the composite matrix. **(08 Marks)**

OR

4. a. Explain General scan line polygon fill algorithm support your claim with a neat diagram. **(08 Marks)**
   b. Explain two dimensional viewing transformation pipeline. **(08 Marks)**

Module-3

5. a. Explain Cohen Sutherland line clipping 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 $(x_{wmax}, y_{wmax}) = (100, 100)$ **(08 Marks)**
   b. Define color model. With neat diagram explain RGB and CMY color model. **(08 Marks)**

OR

6. a. Explain Sutherland Hodgman Polygon clipping. Find the final clipped vertices for the following Fig Q6(a)
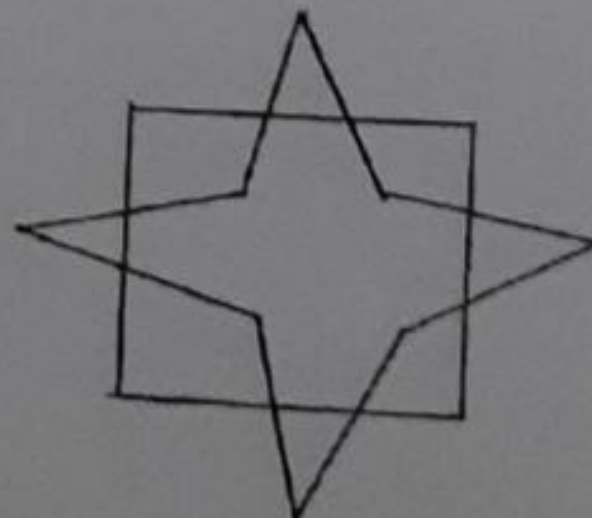

Fig Q6(a) **(08 Marks)**
   b. Explain Specular Reflection and phong model. **(08 Marks)**

Module-4

7 a. Explain in detail perspective projection transformation coordinates. **(08 Marks)**
   b. Write and explain Depth Buffer Algorithm. **(08 Marks)**

OR

8 a. Explain in detail symmetric perspective projection Frustum. **(08 Marks)**
   b. Explain OpenGL Visibility detection functions. **(08 Marks)**

Module-5

9 a. Give the equation representing control points of the Bezier spline curves. Discuss its properties. Also draw Beizer curve with 4 and 3 control points. **(08 Marks)**
   b. Explain Request, sample and event Input modes with the Block diagram. **(08 Marks)**

OR

10 a. With the program snapshot , explain the creation of Menus in OpenGL. **(08 Marks)**
    b. With the role of glCallList ( ) function in creating Displaylists in OpenGL. Write OpenGL code for rendering a simple Animated face. **(08 Marks)**