

CBCS SCHEME

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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 raster 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 Bresenham'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 drawing 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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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42 x 8 = 50, will be treated as malpractice.

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OR

- 6 a. What is Clipping? With the help of a suitable example explain cohen Sutherland 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 pipeline 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, 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 Cohen Sutherland 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 Sutherland Hodgman polygon clipping algorithm with neat sketches. (06 Marks)

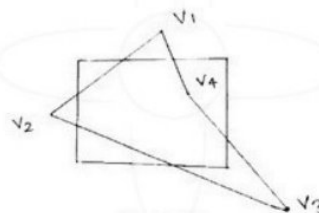


Fig.Q.6(a)

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- b. Explain the different types of light sources supported by OpenGL..
- c. Explain the RGB and CMY color models.

(06 Marks)
(04 Marks)

Module-4

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

(10 Marks)
(06 Marks)

OR

- 8 a. Demonstrate how transformation from world coordinates to viewing coordinates with matrix representation.
- b. Explain orthogonal projections in detail.

(06 Marks)
(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 classes of logical input devices.
- b. Describe the logical input operation of picking in selection mode.
- c. What is DisplayList? Write OpenGL code-segment that generate a blue colored square using display list.

(08 Marks)
(04 Marks)
(04 Marks)

OR

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

(08 Marks)
(04 Marks)
(04 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)
