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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Computer Science and Engineering

Semester End Examination; Dec - 2016/ Jan - 2017

Computer Graphics and Visualization

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. List the advantages and disadvantages of PIN HOLE camera. Explain with diagram. 8
 b. Explain the different computer graphics architecture. 12
- 2 a. Describe the difference between the OpenGL core library, OpenGL utility and OpenGL utility toolkit with an example. 12
 b. Discuss any four control functions in OpenGL. 8

UNIT - II

- 3 a. Perform a 2D rotation of triangle A (0, 0), B (1, 1), C (5, 2),
 i) About the origin 8
 ii) About p (-1, -1). Use homogeneous co-ordinate representation of the vertices.
 b. Write the general form of a scaling matrix with respect to a fixed point p (h, k). 4
 c. Define homogeneous coordinates system, explain geometric transformation using homogeneous coordinates system. 8
- 4 a. What is concatenation transformation? Explain rotation about a fixed point in 3D. 7
 b. Explain affine transformations and give any two OpenGL geometric transformation function. 6
 c. How the rotation of arbitrary axis transformation is followed in OpenGL? 7

UNIT - III

- 5 a. Use the Liang-Barsky line clipping algorithm to clip the line $P_1 = (-15, -30)$ to $P_2 = (30, 60)$ against the window having diagonally opposite corners at (0, 0) and (15, 15). 10
 b. Briefly describe the following : 10
 i) Graphical logical devices ii) Display lists.
- 6 a. Use the Cohen-Sutherland algorithm to clip two line $P_1(40, 15)$, $P_2(75, 45)$ and $P_3 = (70, 20)$ $P_4(100, 10)$ against a window A(50, 10), B(80, 10), C(80, 40) and D(50,40). 10
 b. Write an OpenGL program to demonstrate the hierarchical means to draw a rectangle and to increase or decrease the size of rectangle. 10

UNIT - IV

- 7 a. Briefly discuss the following along with the functions used for the purpose in OpenGL, 10
 i) Perspective projection ii) Orthogonal projections.

- b. Describe gluLookAt function in OpenGL. 4
- c. Describe the 2-Buffer algorithm for identifying the hidden surfaces along with advantages and disadvantages. 6
- 8 a. Derive the simple perspective projection matrix. 7
- b. Write a short note on Interactive Mesh displays. 7
- c. Sketch the various types of views that are employed in computer graphics. 6

UNIT - V

- 9 a. Distinguish between the following :
 - i) Diffuse and Specular reflection
 - ii) Flat surface and Gourand surface rendering 10
 - iii) Local illuminations and Global illumination algorithm
 - iv) Smooth and Flat shading
 - v) Vertex and Pixel shader.
- b. Enlist the different properties of B-spline curve. 6
- c. Why not simply use a point matrix to represent a curve? 4
- 10 a. Explain the different lighting and materials supported in OpenGL. 10
- b. Discuss briefly about the characteristics of Cubic Bezier Curves. 4
- c. Write the different limitation of cubic splines. 6

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