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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Computer Science and Engineering
Semester End Examination; Dec - 2017 / Jan - 2018
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.	With a neat diagram, outline the components of Computer Graphics system.	8
b.	Illustrate the use of primitives in Graphics system.	6
c.	Differentiate between *glortho* and *gluortho* 2D functions.	6
2 a.	Demonstrate the architecture of pinehole camera with a neat diagram.	8
b.	Explain four types of camera specifications.	4
c.	Interpret the *wlor* models of graphics systems with OpenGL functions.	8

UNIT - II

3 a. Outline the inverse transformation matrix for translation, rotation and scaling. Apply inverse translation and scale the triangle vertices (2, 3), (6, 3) and (4, 5). Scaling factor = 0.5, translation factor = 2. — 8

b. Derive an equation for transformation between two dimensional coordinate systems. — 8

c. Explain the OpenGL functions for the following :

 i) Movement of matrix on stack — 4

 ii) Set elements to current matrix

4 a. Derive 2D composite transformation matrix for translation, pivot point rotation and fixed point scaling. — 8

b. Apply shearing on square coordinates (0, 0), (1, 0), (0, 1) and (1, 1) with shearing value 0.5 along X_{ref} -1 and Y_{ref} -1. — 8

c. Explain affine transformations. — 4

UNIT - III

5 a. Compose Liang- Barsky line clipping algorithm with an example. — 10

b. Write the steps of midpoint circle generating algorithm. — 5

c. Construct the following menu using OpenGL functions. — 5

Quit
Transformation	⟹	Translation
		Scaling
		Rotation
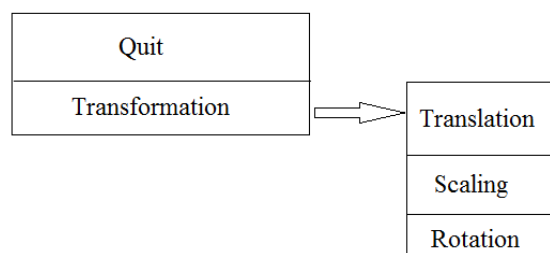
6 a. Predict all raster pixel positions to draw a line form (5, 8) to (12, 10) using DDA algorithm. 6

  b. Develop Sutherland-Hodgeman polygon clipping algorithm for an example. 8

  c. Explain all six logical devices used in graphics system. 6

UNIT - IV

7 a. Differentiate between classical viewing and perspective viewing with examples. 10

  b. Define OpenGL functions used for perspective projections. 5

  c. Explain viewing APIs. 5

8 a. Derive perspective projection matrix used in OpenGL. 10

  b. Explain hidden surface removal (z-buffer) algorithm. 6

  c. Define culling. Explain OpenGL function used for culling. 4

UNIT - V

9 a. Explain about different light sources. 6

  b. Explain OpenGL function used for materials specifications. 8

  c. Explain design criteria of curves. 6

10 a. Differentiate between implicit and explicit representation of curves and surfaces. 8

  b. Design Phong lighting model. 8

  c. Define global illumination. 4

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