

Sixth Semester B.E. Degree Examination, December 2012
Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1
 - a. Briefly explain any six applications of computer graphics. (06 Marks)
 - b. Explain the concept of pinhole camera with appropriate diagrams and equations. (08 Marks)
 - c. Explain the pipeline architecture in computer graphics. (06 Marks)
- 2
 - a. Explain the different types of polygons in OpenGL. (07 Marks)
 - b. Write a program in OpenGL to display the following Fig.Q.2(b) on a raster display system. Assume suitable coordinates for the vertices. (08 Marks)

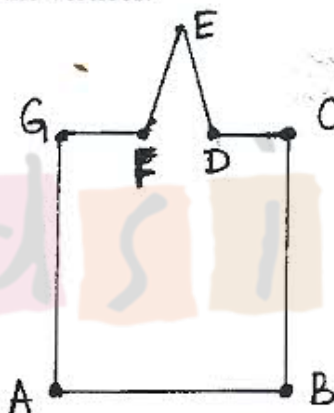


Fig.Q.2(b)

- c. What are two forms of text? Explain. (05 Marks)
- 3
 - a. Explain the logical classification of I/O devices with examples. (06 Marks)
 - b. How are menus and submenus created in OpenGL? Illustrate with an example. (06 Marks)
 - c. Using XOR mode of operation, how are erasable lines drawn in OpenGL. Write OpenGL code and explain. (08 Marks)
- 4
 - a. What are the data structures required to define a cube? (06 Marks)
 - b. Write the transformation matrices for 2D translation, rotation and scaling and explain. (06 Marks)
 - c. What are vertex arrays? Explain how vertex arrays can be used to model a color cube. (08 Marks)

PART – B

- 5
 - a. Show that the following sequence commute:
 - i) A rotation and a uniform scaling.
 - ii) Two rotations about the origin

Note: Assume 2D.

- b. In two dimensions, we can specify a line by the equation $y = mx + h$. Find an affine transformation to reflect two dimensional points about this line. (06 Marks)
- c. Write an OpenGL program to rotate a triangle whose vertices are A(0, 0), B(0, 0), C(5, 10) about the reference point (5, 10) by 45° . Use builtin OpenGL functions for transformations. (08 Marks)
- 6 a. Derive the perspective projection matrix. (08 Marks)
- b. Explain glFrustum (..) API with syntax. (08 Marks)
- c. Bring out the differences between object-space algorithms and image space algorithms. (04 Marks)
- 7 a. Explain the different types of light sources in graphics. (10 Marks)
- b. Explain with code the approximation of a sphere by recursive subdivision. (10 Marks)
- 8 a. Explain the Cohen-Sutherland line clipping algorithm. (10 Marks)
- b. Explain the Z-buffer algorithm for hidden surface removal. How do you enable the Z-buffer algorithm in OpenGL? (10 Marks)

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