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**Sixth Semester B.E. Degree Examination, June/July 2011**  
**Computer Graphics and Visualization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**  
**selecting atleast TWO questions from each Part.**

**PART – A**

1. a. What do you mean by a pipeline architecture? With neat diagram, explain each components of geometric pipeline. (10 Marks)
- b. What is a graphics system? With neat block diagram describe major components of a graphics system. (10 Marks)
2. a. Write a complete OpenGL program for creating 3D sierpinski gasket by subdivision of a tetrahedron. (10 Marks)
- b. Classify the major groups of API functions in OpenGL? Explain any four of them. (06 Marks)
- c. What is an attribute with respect to graphics system? List attributes for lines and polygons. (04 Marks)
3. a. What is the necessity of programming event-driven input? Describe window events and keyboard events. (10 Marks)
- b. What are the features that a good interactive program should include? Describe an OpenGL animating interactive program for the rotating square. (10 Marks)
4. a. In a homogeneous coordinate system given two frames  $(v_1, v_2, v_3, P_0)$  and  $(u_1, u_2, u_3, Q_0)$ . Let a and b be two vectors defined in two frames respectively. Derive the expression that represents vector b in terms of a. (08 Marks)
- b. Along with necessary program segments, explain the modeling of colored cube and bilinear interpolation. (12 Marks)

**PART – B**

5. a. What is concatenation of transformations? Derive concatenated final matrix M for rotating a 3D object about a fixed point. (08 Marks)
- b. Consider a 3D cube object, with fixed point is at the centre of the cube and angle of rotation  $\theta$  about an arbitrary axis defined by two points  $P_1$  and  $P_2$  defining the vector u. Find the final rotation matrix R. (12 Marks)
6. a. Describe flat shading, interpolative and ground shading.  $\theta$  (10 Marks)
- b. With necessary OpenGL program, explain the approximation of sphere by recursive subdivision of a 3D tetrahedron. (10 Marks)
7. a. Give differences between object space and image space methods for hidden surface removal? Describe any one method that uses image space for hidden surface removal. (10 Marks)
- b. What are four basic types of light sources? Explain each. (10 Marks)
8. a. What is the necessity of scan conversion? Describe the digital differential analyzer algorithm for scan conversion of a line segment. (10 Marks)
- b. Explain in brief, various display considerations with respect to conversion from vertices to fragments. (10 Marks)

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