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10CS65

**Sixth Semester B.E. Degree Examination, June/July 2019**  
**Computer Graphics and Visualization**

Time: 3 hrs.

Max. Marks: 100

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

**PART – A**

- 1 a. What is Computer Graphics? Briefly explain the applications of computer Graphics. (10 Marks)  
b. With a neat block diagram, explain the graphics pipeline architecture and give the difference between raster and random scanning system. (10 Marks)
- 2 a. What are the graphics functions which give good API support? (08 Marks)  
b. Write an OpenGL recursive program for 3D sierpinski gasket with relevant comments. (12 Marks)
- 3 a. What is measure and trigger of a logical input device? List and explain various input models. (10 Marks)  
b. What are major characteristics that describe the logical behavior of an input device? Explain the various classes of logical input devices supported by OpenGL. (10 Marks)
- 4 a. Explain the different frame co-ordinates in OpenGL, with suitable examples. (10 Marks)  
b. A square in a 2D system is specified by its vertices (6, 6) (10, 6) (10, 10) and (6, 10). Implement the following by its first finding a composite transformation matrix for the sequence of transformation.  
i) Rotate the square by 45° about its vertex (6, 6)  
ii) Scale the original square by a factor of 2 about its centre. (10 Marks)

**PART – B**

- 5 a. What are Affine transformation? Explain the basic affine transformation in 3D along with their matrix forms. (10 Marks)  
b. What are Quaternions? With an example, explain how Quaternion are used in rotation in a 3D space. Give the mathematical representation of Quaternion. (10 Marks)
- 6 a. What are simple projections? Obtain perspective and orthogonal 4×4 matrix representation. (10 Marks)  
b. Briefly explain the projections in OpenGL and demonstrate with the help of a suitable program. (10 Marks)
- 7 a. With neat diagrams, explain various light sources and develop a program for approximation of sphere by recursive subdivisions. (12 Marks)  
b. Explain phong lighting model and explain specification of materials in OpenGL. (08 Marks)
- 8 a. Explain the Cohen-Sutherland line clipping algorithm and demonstrate with the help of an example. (10 Marks)  
b. Explain the scanline polygon filling algorithm.  
c. What is anti-aliasing? List the various anti-aliasing techniques. (05 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 e.g. 42+8 = 50, will be treated as malpractice.