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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 eg, $42+8=50$, will be treated as malpractice.