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10CS65

**Sixth Semester B.E. Degree Examination, Jan./Feb. 2021**  
**Computers Graphics and Visualization**

Time: 3 hrs.

Max. Marks: 100

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

**PART - A**

- 1 a. What is Computer Graphics? List and explain the applications of the same. (06 Marks)  
b. Discuss the physical Imaging Systems and show the process of Image formation with pinhole camera. (06 Marks)  
c. With a neat sketch, discuss the major steps in Graphics Pipeline Architecture. (08 Marks)
- 2 a. List and explain the major groups of OpenGL API functions along with an example for each. (07 Marks)  
b. Discuss the subtractive and Additive color models. (05 Marks)  
c. What is Sierpinski Gasket? Write an OpenGL program for 3D gasket. (08 Marks)
- 3 a. Discuss the logical classification of input devices with their interaction types. (06 Marks)  
b. What are input modes? Explain the event driven input for keyboard and window events. (06 Marks)  
c. With a neat sketch, explain the display processor architecture along with the display lists creation and execution. (08 Marks)
- 4 a. What are scalar, points and vectors? Explain the procedure for converting a world object frame into camera or eye frame. (10 Marks)  
b. What do you mean by affine Transformation? Discuss the basic 2D transformations such as Rotation, Scaling and Translation along with their matrix representations. (10 Marks)

**PART - B**

- 5 a. Why do we require homogeneous coordinate system? Derive the composite transformation matrix for rotation about a fixed point  $(x_f, y_f)$  by an angle  $\theta$ . (06 Marks)  
b. Explain the 3D rotations with their representations in matrix form. Show how rotation about an arbitrary axis is done. (06 Marks)  
c. How OpenGL does support transformations. Write an OpenGL program to rotate a cube about x and y axes. Use mouse buttons to select the axis of rotation. (08 Marks)
- 6 a. With a neat diagram, explain the different types of views that are employed in computer graphics systems. (10 Marks)  
b. Derive the equations for perspective and parallel projections. Represent the same in matrix form. (10 Marks)
- 7 a. What are light sources? Explain the phong lighting model. (08 Marks)  
b. Explain any two methods for shading polygons. (06 Marks)  
c. How is sphere approximated? Explain. (06 Marks)
- 8 a. Explain the Cohen-Sutherland line clipping algorithm with a neat pseudo code. (10 Marks)  
b. Digitize the line from (5, 8) to (10, 10) using the DDA algorithm. (05 Marks)  
c. Write a note on Z-buffer algorithm for hidden surface removal. (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.