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13MCA34

Third Semester MCA Degree Examination, June/July 2016
Computer Graphics

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

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.

1 a. Explain the world coordinate and screen coordinate reference frame with an example. **(05 Marks)**

b. List the statements needed to setup an OpenGL display window whose top-left corner is at pixel position (100,100). With a window width of 300 pixels and a height 200 pixels. **(04 Marks)**

c. What is OpenGL display call back routine? Give an example. **(03 Marks)**

d. List and explain briefly OpenGL point functions and line functions with example. **(08 Marks)**

2 a. Derive the decision parameters by using mid–point method that can be used to generate a straight line segment with any slope. **(08 Marks)**

b. Write midpoint circle drawing algorithm which exhibits 8–way symmetry. **(07 Marks)**

c. Explain the boundary–fill algorithm in brief. **(05 Marks)**

3 a. What is inverse transformations? Write two–dimensional inverse matrix for translation, rotation and scaling transformations. **(04 Marks)**

b. What is composite transformation? Show that the composition of two rotations is additive and two scaling is multiplicative by concatenating the matrix representations for $R(\theta_1)$, $R_2(0_2)$ and (Sx_1, Sy_1) (Sx_2, Sy_2). **(08 Marks)**

c. Explain general pivot–point rotation and general fixed point scaling transformations in 2–dimensional transformations. **(08 Marks)**

4 a. Explain basic three – dimensional geometric transformations. **(08 Marks)**

b. Write a program to create a triangle by implementing scaling algorithm by zooming/un-zooming i) x – axis ii) y – axis iii) xy- plane. **(08 Marks)**

c. List and explain the basic OpenGL geometric transformations. **(04 Marks)**

5 a. Explain briefly the mapping from window–to–viewport coordinate transformations. **(08 Marks)**

b. Write and explain Cohen–Sutherland line clipping algorithm. **(08 Marks)**

c. Write OpenGL function for the following :
   i) OpenGL project mode
   ii) Current GLUT display window. **(04 Marks)**

6 a. Explain 3–dimensional viewing pipeline. **(06 Marks)**

b. Define projection, depth cueing and surface rendering in 3–dimensional viewing. **(06 Marks)**

c. Explain the three–dimensional matrices from world to viewing coordinates. **(08 Marks)**

7 a. Explain the following :
   i) Orthogonal projection
   ii) Oblique parallel projection. **(10 Marks)**

   b. Explain perspective projections. **(05 Marks)**

   c. Explain viewport transformations and three dimensional screen coordinates. **(05 Marks)**

8 a. What is Bezier spline curve? Derive an equation for Bezier curve. **(08 Marks)**

   b. What is computer based animation? Explain the basic approach to design a animation sequence. **(06 Marks)**

   c. Write short notes on :
   i) Traditional animation technique
   ii) General–computer animation technique. **(06 Marks)**

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