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13MCA34

Third Semester MCA Degree Examination, June/July 2015
Computer Graphics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. What is Open GL? Describe Open GL related libraries and header files. **(08 Marks)**

b. Explain three types of Open GL line functions with example for each. **(06 Marks)**

c. Define following coordinate systems:
   i) Screen coordinates
   ii) Relative coordinates
   iii) Absolute coordinates. **(06 Marks)**

2 a. What is DDA algorithm? Give the steps involved in DDA algorithm. What are the advantages and disadvantages of DDA algorithm? **(10 Marks)**

b. Device the necessary analytical expression involved in the midpoint circle algorithm. Given a circle radius r = 10 and centre at (0, 0), using midpoint circle algorithm determine positions along the circle octant in the first quadrant. **(10 Marks)**

3 a. What is geometric transformation? Derive 2D rotation transformation matrix of point object with an angle of rotation θ with respect to a pivot point at (x, y). **(12 Marks)**

b. Prove that the multiplication of transformation matrices for each of the following sequence and commutative: i) Two successive translations; ii) Two successive scaling. **(08 Marks)**

4 a. With neat sketches, describe the rotation of 3D object about an arbitrary axis with an angle θ and a given pivotal point (x, y). **(14 Marks)**

b. With example, describe basic Open GL geometric transformations. **(06 Marks)**

5 a. Define the terms windows and viewports. Derive the transformation matrix for world coordinates to viewport coordinates. **(10 Marks)**

b. What is clipping? Explain an efficient method for clipping a convex polygon fill area. **(10 Marks)**

6 a. Describe any four 3D viewing concepts. **(08 Marks)**

b. With necessary example, explain various 3D viewing coordinate parameters. **(12 Marks)**

7 a. What do you mean by oblique parallel projection? Derive the oblique parallel projection of a coordinate point (x, y, z) to a position (x_p, y_p, z_p) on a given projection plane at position Z_{vp} along the Z_{view} axis. **(12 Marks)**

b. What do you mean by perspective projection? Derive perspective projection transformation matrix. **(08 Marks)**

8 a. What do you mean by Bezier spline curves? Derive Bezier curve equations? What are the useful properties of Bezier curve? **(08 Marks)**

b. What is computer animation? Describe four development stages of animation sequences. **(12 Marks)**

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