Third Semester MCA Degree Examination, June/July 2019
Computer Graphics

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a.   What is OpenGL? Explain three types of OpenGL line functions with example for each. **(08 Marks)**

    b.   List the statements needed to set up an OpenGL display window with title 'Computer Graphics', whose top left corner is at pixel position (100, 100) with a window width of 400 pixels and a height 300 pixels. **(04 Marks)**

    c.   Explain the OpenGL display call back routine. **(04 Marks)**

    d.   Define the following:
      i)   Screen coordinates
      ii)   Relative coordinates. **(04 Marks)**

2   a.   Write a program to draw line segment using DDA line drawing algorithm. **(07 Marks)**

    b.   Write Midpoint circle drawing algorithm for the circle with input radius r and circle center (x_c, y_c). **(07 Marks)**

    c.   Discuss different types of polygons. List the methods to identify the type of polygons. **(06 Marks)**

3   a.   Define Geometric Transformation. Explain the 2 Dimensional Translation, Rotation and Reflection transformations. **(10 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 $R(\theta_1) R(\theta_2)$ and $(Sx_1, Sy_1) (Sx_2, Sy_2)$. **(07 Marks)**

    c.   Write the inverse matrix representation for two dimensional translation, rotation and scaling transformations. **(03 Marks)**

4   a.   Explain 3 dimensional translation, reflection and scaling transformations. **(09 Marks)**

    b.   Describe Basic OpenGL geometric transformation with example. **(06 Marks)**

    c.   With neat sketches, describe the rotation of 3D object about an axis that is parallel to one of the coordinate axis. **(05 Marks)**

5   a.   Define the terms Window and Viewport. **(04 Marks)**

    b.   Explain Cohen Sutherland line clipping Algorithm. **(08 Marks)**

    c.   Brief point clipping and text clipping. **(08 Marks)**

6   a.   Explain Projection, Depth Cueing and Surface rendering in 3 dimensional viewing. **(06 Marks)**

    b.   Brief three dimensional viewing pipe line in detail. **(06 Marks)**

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

7   a. Explain the following:
        i)   Orthogonal projections
        ii)   Oblique parallel projections.   (10 Marks)
    b. What do you mean by perspective projection? Derive perspective projective transformation
       matrix.   (10 Marks)

8   a. What is computer animation? Explain the basic approach to design animation sequences.
                                                                               (08 Marks)
    b. Write short notes:
        i)   Traditional Animation Techniques
        ii)   Double Buffering
        iii) Bezier Spline Curve.   (12 Marks)

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