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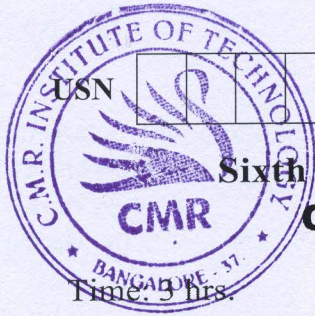**Sixth Semester B.E. Degree Examination, June/July 2024**
Computer Graphics and Visualization

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   With a neat diagram, explain the working nature of CRT with its different parts.   **(08 Marks)**
    b.   Write an OpenGL program to draw a line segment.   **(06 Marks)**
    c.   With suitable OpenGL code segments and examples, define different OpenGL line primitive constants available.   **(06 Marks)**

OR

2   a.   Explain DDA line drawing algorithm with necessary equations.   **(06 Marks)**
    b.   Illustrate the logic of Bresenham's line generation algorithm by digitizing the line with endpoints (20, 10) and (30, 18). Find out all intermediate pixel points along the line.   **(06 Marks)**
    c.   Explain the classification of Flat-Panel display monitors with examples.   **(08 Marks)**

Module-2

3   a.   With suitable code segments, define different polygon fill primitives available in OpenGL.   **(06 Marks)**
    b.   Explain general scan-line polygon fill algorithm.   **(08 Marks)**
    c.   Briefly explain the data-structures with respect to polygon table with an example.   **(06 Marks)**

OR

4   a.   Prove that :
    (i)   Two successive translations are additive in nature.
    (ii)   Two successive rotations are additive in nature
    (iii) Two successive scalings are multiplicative in nature   **(06 Marks)**
    b.   Derive the matrix for rotation about a fixed point.   **(08 Marks)**
    c.   With syntax and examples, define OpenGL functions available for basic transformation methods.   **(06 Marks)**

Module-3

5   a.   Explain the concept of Cohen-Sutherland line clipping algorithm with necessary sketches and equations.   **(08 Marks)**
    b.   Explain Sutherland-Hodgeman polygon clipping algorithm.   **(06 Marks)**
    c.   Apply Sutherland-Hodgeman polygon clipping to clip the following polygon Fig.Q5(c) against the given clipping window.
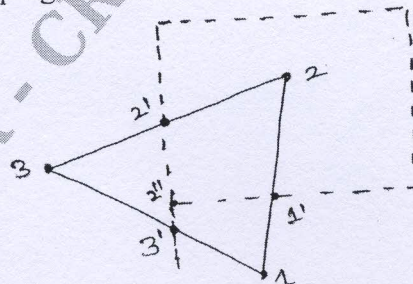

Fig.Q5(c)   **(06 Marks)**

OR

6 a. In detail explain the 3-D transformations in homogeneous coordinate system with necessary matrices. **(08 Marks)**

b. Explain RGB and CMY color models. **(06 Marks)**

c. Briefly explain the different light sources. **(06 Marks)**

Module-4

7 a. With a neat diagram, explain 3-D viewing pipeline. **(08 Marks)**

b. Explain the transformation from world to viewing coordinates with necessary matrices and equations. **(06 Marks)**

c. With a neat sketch, define types of projections. Also compare them. **(06 Marks)**

OR

8 a. With necessary sketches, define the syntax of following OpenGL functions in 3D:

(i) For perspective projection

(ii) For orthographic projection

(iii) Look At function **(08 Marks)**

b. Briefly explain different OpenGL visibility detection functions available in OpenGL. **(06 Marks)**

c. Explain depth-Buffer algorithm in detail. **(06 Marks)**

Module-5

9 a. Explain the classifications of logical input devices. **(06 Marks)**

b. With a neat diagram, explain different input modes. **(06 Marks)**

c. With an example of code-segment, explain how to define and execute display lists using OpenGL. **(08 Marks)**

OR

10 a. With an example of code segment, explain different functions used to create menus in OpenGL. **(08 Marks)**

b. Describe how to generate text using OpenGL functions along with its types. **(06 Marks)**

c. Explain Bezier Spline curves with its necessary equations. **(06 Marks)**

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