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Question Paper

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MANIPAL UNIVERSITY

SCHOOL OF INFORMATION SCIENCES (SOIS)
SECOND SEMESTER MASTER OF ENGINEERING - ME (Medical Software)
DEGREE EXAMINATION- APRIL / MAY 2017
Friday, 28, 2017
Time : 10:00 AM - 1:00 PM

Computer Graphics - Elective 1 [MMS 616.3]

Marks: 100 **Duration: 180 mins.**

A

Answer all the questions.

1) Consider the line from (0, 0) to (4, 6). Use DDA algorithm to rasterize this line. (10)

2) Explain the midpoint circle drawing method for a given radius r and screen center position (x_c, y_c). Derive the decision parameters P_k, and P_{k+1}. (10)

3) Deduce the transformation matrix for 2D translation and show that the two successive translations are additive. (10)

4) Obtain the transformation matrix for the scaling of an object with scaling parameters s_1 and s_2 applied in the directions defined by the angular displacement θ. Apply the transformation matrix to the unit square with $s_1 = 1$, $s_2 = 2$ and $\theta = 45^o$ and draw the scaled object. (10)

[5+5 Marks]

5) Explain Cohen-Sutherland line clipping method for all the possibilities of a line intersection with rectangular clip window boundaries. (10)

6) (i) Write the transformation matrices for 3D translation and scaling.
(ii) Write the 3D transformation matrices for x-axis rotation, y-axis rotation and z-axis rotation. (4+6) (10)

7) (10)

What is projection? Explain 3D object to 2D device transformation process with suitable diagram. Briefly explain the taxonomy of projections. [2+4+4 Marks]

8) Magnify the triangle with vertices A(0, 0), B(1, 1), C(5, 2) to twice its size while keeping C(5, 2) fixed. (10)

9) Explain how the z-buffer method is used to identify the visible surfaces in a 3D polyhedron (10)

10) With suitable diagram explain the Flood fill algorithm used in polygon filling (10)

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