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MCS-053

**MASTER OF COMPUTER
APPLICATIONS (MCA) (REVISED)**

Term-End Examination

December, 2021

**MCS-053 : COMPUTER GRAPHICS AND
MULTIMEDIA**

Time : 3 Hours

Maximum Marks : 100

Note : (i) *Question No. 1 is compulsory.*

(ii) *Answer any **three** questions from the rest.*

1. (a) Derive a 2D transformation matrix for reflection about the line $y = -x$. 5
- (b) Briefly discuss the limitations of Cohen-Sutherland line clipping algorithm. How

did Cyrus-Beck algorithm overtook the limitations of Cohen-Sutherland algorithm ?

5

- (c) Briefly discuss the Gourand Shading and Phong Shading. Which of the two is better ? Why ? 5

- (d) Draw tree structure to describe the taxonomy of projection. 5

- (e) Determine final coordinates of triangle ABC when it is subjected to anticlockwise rotation of 45° about origin. The coordinates of vertices A, B and C are (0, 0); (1, 1); and (5, 2), respectively. 5

- (f) Discuss the relevance of edge table and vertex table for polygon representation. 5

- (g) Explain the difference between parametric and geometric continuities. 5

- (h) Briefly discuss area subdivision algorithm. Also give *one* application of this algorithm. 5

2. (a) Write DDA line generation algorithm. What are the limitations of DDA line generation algorithm ? Use DDA line generation algorithm to produce a line segment from (2, 3) to (9, 8). 10

P. T. O.

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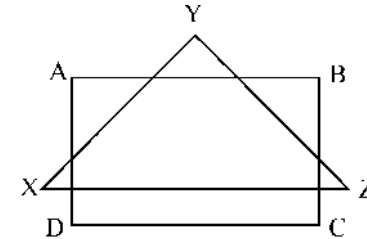
- (b) Compare parallel projection and perspective projection. Determine the projection matrix for the projection of point $P(x, y, z)$ on $z = d$ plane, where the centre of projection is at $(0, 0, -d)$. 10
3. (a) Write Z-Buffer algorithm. Explain. How the depth value (Z) is calculated for surface position (x, y) in the Z-buffer algorithm ? 5
- (b) What is Bezier curve ? Determine three points on the Bezier curve, whose control points are $p_0 (1, 1)$; $p_1 (2, 3)$; $p_2 (4, 3)$; $p_3 (5, 1)$. 5
- (c) Discuss all the cases of scan line polygon fill algorithm with suitable diagram. 5
- (d) Compare Ray tracing with Ray casting. 5
4. (a) Write Bresenham circle generation algorithm and apply it to draw a circle with radius (r) = 10 units, determine positions along the circle octants in first quadrant from $x = 0$ to $x = y$. 10

P. T. O.

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- (b) Briefly discuss the Sutherland-Hodgman polygon clipping algorithm. Use it to clip the polygon XYZ against the rectangular window ABCD, as shown below : 10



5. (a) Compare and contrast the following : 10
- (i) Graphics and Animation
 - (ii) Bitmap graphics and Vector graphics
 - (iii) GIF and JPEG
 - (iv) Zero and Non-zero accelerations for simulating motion
- (b) Write short notes on the following : 10
- (i) Specular reflection
 - (ii) Authoring tools
 - (iii) Stochastic animation
 - (iv) Oblique projection

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