MCS-053

MASTER OF COMPUTER

APPLICATIONS (MCA) (REVISED)

Term-End Examination

June, 2020

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) Compare frame buffer with display buffer. How frame buffer overcomes the limitation of display buffer ?   5

(b) Compare Cyrus-Beck line clipping algorithm with Cohen-Sutherland line clipping algorithm. Can we use Cyrus-Beck line algorithm for non-convex windows ? Justify your answer. 5

(c) Write pseudo code for DDA line generation algorithm. What are the limitations of DDA algorithm ? 5

(d) Write generalized 2D translational transformation matrix for Euclidean coordinate system and Homogeneous coordinate system. Among the two coordinate system, which system is better to work with in computer graphics ? Justify. 5

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

(f) What are parametric continuities ? How do they differ from geometric continuities ?   5

(g) What is intensity interpolation technique ? Discuss the role of intensity interpolation in Gourand shading.   5

(h) What are authoring tools ? What do you understand by icon based authoring tools ?

5

2. (a) Write the mid point circle generation algorithm and use the algorithm to produce a circular arc of radius 8 units in the first quadrant, from $x = 0$ to $x = y$.   10

(b) Verify that two successive rotations are additive in nature i. e., :   5

$$R(\theta_1).R(\theta_2) = R(\theta_1 + \theta_2)$$

where $R(\theta_1)$, $R(\theta_2)$ and $R(\theta_1 + \theta_2)$ are 2D-rotational transformation matrix, respectively.

(c) Explain window to viewpoint transformation with suitable diagram.   5

3. (a) Briefly describe the term Bezier curve. How do Bezier curves contribute to the generation of Bezier surfaces. Give mathematical expression for both i. e., Bezier curves and Bezier surfaces; also give utility of both. Calculate two points on the Bezier curve whose control points are $p_0(1,1); p_1(2,4); p_2(3,6); p_3(4,8)$.   10

(b) What is video conferencing ? Discuss the challenges related to such facilities.   5

(c) What are the maximum number of objects that can be handled by the Z-buffer algorithm ? Give reason. What will happen if Z-buffer algorithm is used and it is found that two polygons have same Z-value.   5

4. (a) How frame spacing relates to the simulation of acceleration in any animation ? Draw suitable diagram in support of your discussion. Determine mathematical expression, which can be used to simulate zero acceleration, positive acceleration and negative acceleration in any animation.   10

(b) Determine the perspective projection of point $P(x, y, z)$ on $Z = 0$ plane, where centre

of projection is at E $(0, 0, -d)$. Draw suitable diagram for the given problem.   5

(c) Explain Sutherland-Hodgman polygon clipping algorithm, with suitable example and diagram.   5

5. Write short notes on the following : $4 \times 5 = 20$

   (a) Recursive approach for scan line polygon filling.

   (b) Polygon representation methods.

   (c) Oblique projections and its types

   (d) Stochastic animation

   (e) Behavioural animation

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