No. of Printed Pages : 4

MCS-053

MASTER OF COMPUTER APPLICATIONS (MCA)

Term-End Examination

December, 2022

MCS-053 : COMPUTER GRAPHICS AND MULTIMEDIA

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No.* ***1*** *is compulsory. Attempt any* ***three*** *questions from the rest.*

1. (a) What is homogeneous coordinate system ? Why is it needed ? Explain with the help of an example. 5

   (b) What is frame buffer ? How is intensity controlled with the help of frame buffer ? 5

   (c) Write mid-point circle generation algorithm. 5

(d) Write Cyrus-Beck line clipping algorithm. Compare it with Cohen-Sutherland line clipping algorithm. 5

(e) What is seed fill or flood fill algorithm ? Distinguish it with scan line polygon fill algorithm. 5

(f) Describe DDA algorithm. Modify the DDA algorithm for negative sloped lines. Discuss both the case i.e., slope > 1 and 0 < slope < 1. 5

(g) Briefly describe about animation. Differentiate between graphics and animation. 5

(h) Briefly discuss the taxonomy of projection. 5

2. (a) Reflect the diamond-shaped polygon whose vertices are A (– 1, 0), B (0, – 2), C (1, 0) and D (0, 2) about : 10

(i) the horizontal line $y = 2$

(ii) the line $y = x + 2$

(b) Given four control points P_0 (1, 1), P_1 (2, 3) P_2 (4, 3) and P_3 (3, 1). Determine two more points on the same Bezier curve. 5

(c) Prove the following properties of Bezier curve : 5

(i) $P(u = 0) = p_0$

(ii) $\sum_{i=0}^{n} B_{n,i}(u) = 1$

3. (a) Compare parallel and perspective projection.

Derive the general transformation of parallel projection onto the *xy*-plane in the direction $(\vec{d})$ of projection $\vec{d} = a\hat{i} + b\hat{j} + c\hat{k}$. 10

(b) Find the 3 × 3 homogeneous co-ordinate transformation matrix for each of the following : 10

(i) Scale an image by 3 units in both X and Y-direction w. r. t. origin.

(ii) Shift the image up by 2 units and down by 1 unit w. r. t. origin.

(iii) Rotate the image by 45° in anticlockwise direction w. r. t. origin.

4. (a) Explain the area subdivision method for hidden surface removal with suitable example. 10

(b) Compare Gourand Shading and Phong Shading. 5

(c) Briefly discuss the concept of parametric continuities in Bezier curve. 5

5. Write short notes on any ***four*** of the following : 4×5=20

(a) Sutherland-Hodgman algorithm

(b) Z-Buffer algorithm

(c) Simulating zero acceleration in animation

(d) Authoring tools

(e) Morphing