No. of Printed Pages : 4

MCS-053

MASTER OF COMPUTER APPLICATIONS (MCA) REVISED

Term-End Examination

June, 2023

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) Explain how frame buffer is used to store picture information. 5

   (b) Write the difference between Random and Raster scan display devices. 5

   (c) Write the DDA algorithm for line generation and modify the same for negative sloped lines. 5

(d) Perform 45° rotation of triangle ABC; A(0, 2) B(–1, –1), C(1, –1) about an axis passing through origin. 5

(e) Differentiate between the following : 5

(i) Bitmap *vs* Vector graphics

(ii) Hypertext *vs* Hypermedia

(f) What is 'projection' in computer graphics ? Give taxonomy of projections. 5

(g) Explain shading and its types. 5

(h) How many key frames are required for a one-minute animation film sequence with no duplications ? What will be the answer if duplication is there ? 5

2. (a) Write Bresenham's line generation algorithm. Draw the line segment joining the point (2, 4) and (9, 9) using Bresenham's line generation algorithm. 10

(b) Write midpoint circle generation algorithm. Determine positions along the circle octants in Ist Quadrant from $x = 0$ to $x = y$ with given a radius $r = 5$. 10

3. (a) Find the transformation matrix for the reflection about the line $y = -x$. 5

   (b) What is vanishing point in context of projection, in computer graphics ? Consider a cube of size 4 units that is lying on the origin, obtain the perspective projection of this cube on $z = 0$ plane having the centre of projection at E(0, 0, –2). Can we find the vanishing point for this projection ? 10

   (c) "Simultaneous shearing is not the same as shearing in one direction; followed by shearing in another direction." Justify the statement mathematically. 5

4. (a) Compare Cohen-Sutherland line clipping algorithm with Cyrus Back line clipping algorithm. 5

   (b) Prove the following properties of a Bezier curve : 5

   (i) $p(u = 0) = P_0$

   (ii) $p(u = 1) = P_n$

   where u is the parameter and P_0 and P_n are the zeroth and nth control point, respectively.

(c) Explain the following :

(i) Morphing

(ii) Cell Animation 5

(d) What is windowing transformation ? Discuss the real life example where you can apply the windowing transformation. 5

5. (a) What are the authoring tools ? List various types of authoring tools, Discuss any *one* of the authoring tools. 5

(b) Write Z-buffer algorithm. Give *one* advantage and one disadvantage of Z-buffer algorithm. 5

(c) Compare parametric and geometric continuities of Bezier curves. 5

(d) Differentiate between (any *two*) : 5

(i) Analog sound and digital sound

(ii) Lossless audio formats and lossy audio formats

(iii) Ray tracing and ray casting