MCS-053

MCA (Revised)
Term-End Examination
June, 2015

09433

MCS-053 : COMPUTER GRAPHICS AND MULTIMEDIA

*Time : 3 hours*   *Maximum Marks : 100*

Note : Question number 1 is compulsory. Answer any three questions from the rest.

1. (a)   What are the limitations of DDA line generation algorithm ? Explain the algorithm that was proposed to overcome the limitation of DDA line generation algorithm.   5

    (b)   Write 3D transformation matrices for rotation using homogeneous coordinate system with respect to X, Y and Z axes respectively.   5

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

    (d)   How is frame buffer used to control the color and intensity of the computer screen ?   5

(e) Determine the general expression for a cubic Bezier curve, with vertices (control points) $P_0(0, 40)$; $P_1(40, 40)$; $P_2(60, 20)$; $P_3(60, -10)$. *5*

(f) How many key frames are required to produce a five-minute animation film sequence with no duplicates ? *5*

(g) Explain Window-to-Viewport transformation with the help of a diagram. *5*

(h) Explain how ray tracing differs from ray casting with the help of a diagram. *5*

2. (a) Derive the conditions for generating the line segment, by using DDA line generation algorithm for both cases (i.e. when slope < 1 and slope > 1). Write the pseudo code of DDA line generation algorithm, and use it to produce a line segment between points (2, 4) and (9, 9). *10*

(b) Explain the Area-subdivision method of visible surface detection. *5*

(c) Explain the mathematical expression for the combined effect of Ambient, Diffused and Specular reflection for Phong's Specular Reflection Model. *5*

3. (a) Determine the point of intersection of the projection of edges AB and CD of a unit cube, on z = 0 plane, where the centre of projection is at $(0, 0, -d)$. **10**
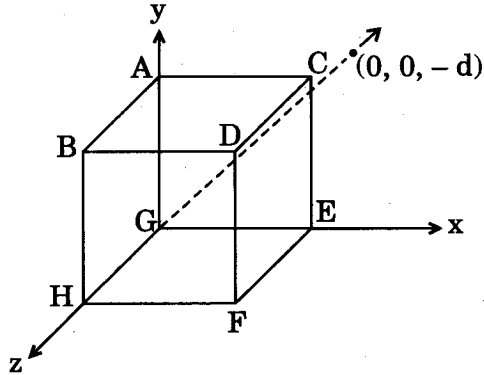
(b) Verify that two successive rotations are additive in nature i.e.

$$R(Q_1) \cdot R(Q_2) = R(Q_1 + Q_2)$$

where $R(Q_1)$, $R(Q_2)$ and $R(Q_1 + Q_2)$ are 2D-rotational transformations, respectively. **5**

(c) Compare and contrast the Cohen-Sutherland line clipping algorithm with the Cyrus-Beck line clipping algorithm with the help of a diagram. **5**

4. (a) How does simulation of zero acceleration differ from non-zero acceleration, in an animation ? Briefly discuss the formulation of a mathematical function, that regulates the frame spacing in an animation with positive acceleration. **10**

(b) Explain any *two* of the following :　　　5

   (i) Keyframe Systems

   (ii) Scripting Systems

   (iii) Morphing

(c) Explain the differences between parametric
    and geometric continuities in Bezier curve.　　5

5. (a) Differentiate between any *two* of the
       following :　　　5

   (i) Graphics and Animation

   (ii) Printer and Plotter

   (iii) Hypertext and Hypermedia

(b) Briefly describe any *two* of the following
    file formats :　　　5

   (i) jpeg

   (ii) tiff

   (iii) bmp

   (iv) gif

(c) Explain any *two* of the following :　　　5

   (i) Authoring tools

   (ii) Z-buffer algorithm

   (iii) Video file formats

(d) What is Video Conferencing ? Discuss the
    challenges related to such facilities.　　　5