No. of Printed Pages : 4

MCS-053

MCA (Revised)
Term-End Examination

09447

June, 2015

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

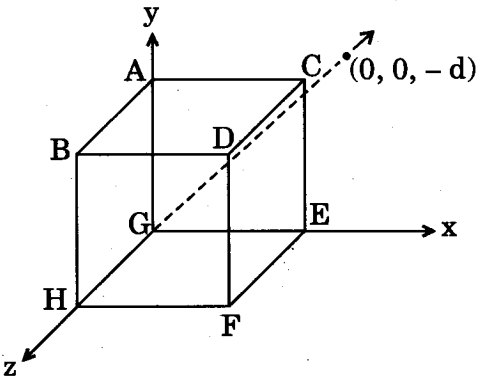
(h) Explain how ray tracing differs from ray casting with the help of a diagram. 5

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