|MCS-053|

MCA (Revised)
Term-End Examination
05985   December, 2016

MCS-053 : COMPUTER GRAPHICS AND MULTIMEDIA

Time : 3 hours *Maximum Marks : 100*

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

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

    (i) Computer Graphics and Animation

    (ii) Random Scan and Raster Scan display devices

    (iii) Printer and Plotter

    (b) Write Bresenham's line generation algorithm. Use it to draw a line segment joining (20, 10) and (25, 14). 7

    (c) Discuss Cyrus-Beck line clipping algorithm. How does the algorithm use the parameter 't' of parametric line equation, to determine the Potentially Entering (P_E) and Potentially Leaving (P_L) points ? 8

    (d) Find the transformation matrix for reflection about the line y = 4x. 5

(e) Prove the following properties of Bezier curves : 5

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

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

(f) Write short notes on any *three* of the following : 6

(i) Anti-aliasing

(ii) Hidden Surface Removal Algorithm

(iii) Ray Casting

(iv) Hypermedia

(g) Compare and contrast any *two* of the following : 4

(i) Vector Graphics and Bitmap Graphics

(ii) JPEG and GIF

(iii) Key Frame Animation and Cel Animation

2. (a) How are frame buffers used to control colour and intensity of any image ? You are required to support your answer with suitable diagrams and bit plane tables. 5

(b) Write DDA algorithm for line generation. Mention the limitations of DDA algorithm. How are the limitations of DDA algorithm resolved by Bresenham's line generation algorithm ? 8

(c) Briefly discuss the term "Windowing Transformation". Support your discussion with a suitable diagram and related mathematical equations. 7

3. (a) What is the role of Parametric continuities and Geometric continuities in Bezier curves ? Discuss the different types of Parametric and Geometric Continuities. Support your discussion with necessary diagrams and mathematical equations. *7*

(b) Briefly discuss Gouraud and Phong Shading. Highlight the problems associated with interpolated shading. *7*

(c) Discuss Area Subdivision method. List the conditions of Area Subdivision method to finalize that no further surface division is required. *6*

4. (a) A polygon ABCD with coordinates A(2, 2), B(4, 2), C(4, 4) and D(2, 4), is reflected about the line $y = 1$. What would be the coordinates of the reflected vertices ? Use Homogeneous coordinate system. *5*

(b) Show that two successive reflections about either of the coordinate axes is equivalent to a single rotation about the origin. *5*

(c) Write short notes on any *two* of the following : *5*

(i) Perspective Projection

(ii) Orthographic Projection

(iii) Oblique Projection

(d) Determine the perspective projection matrix, when a point P(X, Y, Z) is projected on Z = 0 plane such that the centre of projection is at (0, 0, – d).   5

5. (a) How many key frames are required for a 30-second animation film sequence with no duplicates ? How are the results affected, if five in-between frames are inserted between each pair of key frames ?   5

(b) Briefly discuss any *two* of the following :   5

   (i) Morphing

   (ii) Video Compression

   (iii) Sprite Animation

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

   (i) Simulating positive acceleration and Simulating negative acceleration in Animation

   (ii) Hypertext and Hypermedia

   (iii) Computer assisted animation and Computer generated animation

(d) What are Authoring tools ? List various types of Authoring tools ? Discuss any one of the tools.   5