MCA (Revised)

05254　**Term-End Examination**

December, 2015

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)　What is staircase effect ? Do you agree with the statement "Staircase effect facilitates smooth line generation" ? Justify your answer with suitable arguments.　　5

　　(b)　Compare and contrast the 2D Euclidean coordinate system with the 2D Homogeneous coordinate system with the help of an example.　　5

　　(c)　Determine the perspective projection of point P(x, y, z) on z = 0 plane, where the centre of projection is at E(0, 0, −10).　　5

　　(d)　How does frame buffer differ from the display buffer ? How does frame buffer overcome the limitation of display buffer ?　　5

(e) Prove the following properties of a Bezier curve :

(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 n^{th} control points, respectively. *5*

(f) How does frame spacing influence the simulation of acceleration in an animation ? Justify your answer with suitable illustrations. *5*

(g) Differentiate between window and viewport region ? Explain how window to viewport mapping is performed. *5*

(h) What is Aliasing ? Explain how Antialiasing overcomes the problem of Aliasing. *5*

2. (a) Write the pseudocode for Bresenham circle generation algorithm, and use it to produce an arc of radius r = 4 units, in the first quadrant from x = 0 to x = y. *10*

(b) Differentiate between scan line polygon fill algorithm and flood fill algorithm. *5*

(c) Differentiate between Parallel projection and Perspective projection. *5*

3. (a) Determine the final coordinates of the perspective projection of an object, when the object is first rotated w.r.t. y-axis by 30° in clockwise direction and then w.r.t. x-axis by 45° in clockwise direction and finally it is projected on to $z = 0$ plane with the centre of projection at $(0, 0, -5)$. *10*

(b) Show that 2D rotational transformations are commutative in nature i.e. $R_1 \cdot R_2 = R_2 \cdot R_1$. *5*

(c) Explain all the four cases of Sutherland-Hodgman polygon clipping algorithm, with suitable examples. *5*

4. (a) Formulate the mathematical function, to regulate the frame spacing, for simulating

(i) Zero acceleration motion,

(ii) Negative acceleration motion. *10*

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

(i) Cel Animation

(ii) Frame Animation

(iii) Sprite Animation

(c) Briefly discuss the different polygon representation methods. *5*

5. (a) Expand the following abbreviations of file formats : *5*

   (i) GIF

   (ii) JPEG

   (iii) MPEG

   (iv) TIFF

   (v) BMP

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

   (i) Compression in digital video

   (ii) Authoring tools

   (iii) Morphing

(c) Write the pseudocode for Z-buffer algorithm for visible surface detection. What is the maximum number of objects that can be handled by Z-buffer algorithm ? Give two advantages and two disadvantages of Z-buffer algorithm. *10*

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