MCA (Revised)
Term-End Examination
December, 2013
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 raster scan and random scan display devices.  5
(b) What is homogeneous co-ordinate system? Why is it needed? Explain this with the help of an example.  6
(c) What are the various parametric continuity conditions in curve drawing?  5
(d) Explain Z buffer algorithm for hidden surface removal. State its advantages.  6
(e) Explain the following terms:
   (i) Resolution (Screen)  6
   (ii) Aspect Ratio
   (iii) Refresh rate
(f) Differentiate between vector graphics and bitmap graphics.  3
(g) Explain Phony Specular Reflection model.

(h) Explain Bresenham’s algorithm for drawing a line whose slope is $|m| \leq 1$.

2. (a) Draw a line from $(5, 6)$ to $(15, 12)$ on a raster screen using DDA algorithm.

(b) Using cohen sutherland line clipping algorithm clip the following line against a window which has lower left corner at $(2, 2)$ and upper right corner at $(5, 5)$

Line 1 : $A(3, 1)$ $B(2, 4)$
Line 2 : $C(6, 4)$ $D(13, 8)$

(c) Differentiate between window and view port: Find the normalized transformation $N$ which uses the rectangle $A(1, 4)$ $B(4, 1)$ $C(8, 5)$ $D(5, 8)$ as a window and the normalized device screen as a view port whose lower left corner $L(0, 0)$ and upper right corner $R(1, 1)$.

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

(b) Given a Square ABCD whose co-ordinates are $A(0, 0)$, $B(3, 0)$, $C(3, 3)$, $D(0, 3)$ find the final transformation matrix after translating 2 units in both $x$ and $y$ direction, followed by scaling of 1.5 units in the $x$-direction.
(c) Differentiate between parallel and perspective projection. Derive the general transformation for parallel projection on to a given view plane, where the direction of projection:

\[ d = ai + bj + ck \]

is along the normal

\[ N = n_1i + n_2j + n_3k \]

with the reference point \( R_0(x_0, y_0, z_0) \)

4. (a) Derive a mathematical expression for drawing a cubic Bezier curve.

Given four control points \( P_0(1, 1), P_1(2, 3), P_2(4, 3) \) and \( P_3(3, 1) \). Determine 2 more points on the same Bezier curve

(b) Find the 2D - transformation matrix of reflection of the \( \triangle ABC \), where \( A(0, 0), B(4, 0) \) and \( C(3, 3) \) about the line passing through the points \( (1, 3) \) and \( (-1, -1) \)

(c) Categories the various types of parallel and perspective projection

5. (a) Explain different types of animation?

(b) What is compression? Explain the need for video compression.

(c) Explain various video file formats.

(d) Explain any two types of authoring tools.