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MCS-053

MASTER OF COMPUTER APPLICATIONS (MCA) (REVISED)

Term-End Examination

June, 2021

MCS-053 : COMPUTER GRAPHICS AND MULTIMEDIA

Time : 3 Hours *Maximum Marks : 100*

Note : (*i*) *Question No.* ***1*** *is compulsory.*

(*ii*) *Answer any* ***three*** *questions from the rest.*

1. (a) Write rotational transformation matrix for 3D rotation, in homogeneous coordinate system with respect to Y and Z axes respectively. 5

(b) What is a frame buffer ? Explain, how frame buffer is used to put control over colour and intensity of the pixels on screen. 5

(c) Derive the expression for windowing transformation, elaborate it with suitable diagram. 5

(d) Write DDA algorithm for generation of line segment. What are the limitations of DDA algorithm ? How Bresenham line generation algorithm overtook the limitation of DDA algorithm ? 5

(e) Compare and contrast parallel and perspective projection. 5

(f) Prove the following properties of Bezier curve : 5

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

(ii) $p(u = 0) = p_0$

(g) Verify the statement "two successive rotations are additive in nature." 5

(h) With the help of a suitable diagram, explain the mathematical formulation for simulating zero acceleration in any animation. 5

2. (a) Explain Cyrus-Beck line clipping algorithm. Briefly discuss the advantage of Cyrus-Beck line clipping algorithm over Cohen-Sutherland line clipping algorithm. 8

(b) Write Bresenham line generation algorithm and apply it to generate a line segment from (20, 10) to (25, 14). 7

(c) Explain the term Anti-Aliasing with suitable example. 5

3. (a) Determine the final coordinates of the polygon ABCD, A (1, 1); B (1, 5); C (5, 5); D (5, 1). When it is scaled up, to twice its size with respect to the centroid of the polygon ABCD. 7

(b) Compare and contrast the following (any *two*) : 8

(i) Orthographic and oblique projection

(ii) Diffused and specular reflection

(iii) Ray casting and ray tracing

(c) What is homogeneous coordinate system ? What is the advantage of homogeneous coordinate system over Euclidean coordinate system ? Discuss with suitable example. 5

4. (a) Differentiate between scan line polygon fill algorithm and flood fill algorithm. 6

(b) Write Z-Buffer algorithm for hidden surface defection. Explain, how this algorithm is applied to determine the hidden surfaces. 6

(c) Write short notes on any *two* of the following : 8

(i) Authoring tools and its types

(ii) Multimedia tools and its types

(iii) Video file formats

5. Briefly discuss the following : $10 \times 2 = 20$

(a) Bezier surfaces

(b) Sweep representations

(c) Geometric continuities (G_0 and G_1)

(d) Lossy compression algorithms

(e) Sutherland-Hodgman clipping algorithm

(f) Morphing

(g) Behavioural animation

(h) Vanishing point

(i) Staircase effect

(j) Phong shading