No. of Printed Pages : 5

MCS-053

MCA (Revised)

Term-End Examination

04506

June, 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) Write the expansion for the following file formats : 5

(i) TIFF

(ii) PNG

(iii) JPEG

(iv) BMP

(v) CDR

(b) Write the DDA line generation algorithm. Modify this DDA line generation algorithm, for negative sloped lines. 5

(c) Compare the following : 5

(i) Scanline Polygon fill algorithm and Flood fill algorithm

(ii) Cohen-Sutherland line clipping algorithm and Cyrus-Beck line clipping algorithm

(d) Briefly discuss the term Foreshortening factor. How is Foreshortening factor used to identify that a projection is Isometric, Dimetric or Trimetric ? 3

(e) Determine the final coordinates of ΔABC A (0, 2); B (–1, –1); C (1, –1), when it is subjected to a clockwise rotation of 45° about the origin. How do the obtained results differ, if the performed rotation is anticlockwise ? 7

(f) Write the Z-buffer algorithm. What are the maximum number of objects that can be handled by Z-buffer algorithm ? What will happen if Z-buffer algorithm is used, and it is found that two polygons have same Z-value ? 7

(g) Explain the following : 4

(i) Ray casting

(ii) Ray tracing

(h) How does Phong Shading differ from Gouraud Shading ? Give the merits and demerits of Phong Shading. 4

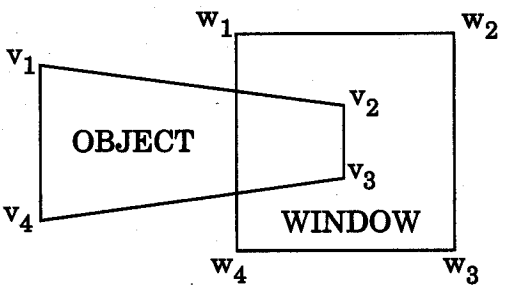
2. (a) Compare and contrast the following : 5

(i) Cohen-Sutherland clipping algorithm and Sutherland-Hodgman clipping algorithm

(ii) Caligraphic and Raster scan display devices

(b) Write the Bresenham's Circle Generation algorithm. Use it to produce a circular arc of radius 8 units in the first quadrant, from $x = 0$ to $x = y$. *8*

(c) Explain all the four cases of Sutherland-Hodgman polygon clipping algorithm and use these four cases to clip the figure below :



where, v_1, v_2, v_3 and v_4 are vertices of the object and w_1, w_2, w_3 and w_4 are vertices for the window region. *7*

3. (a) Using rotational transformation matrix, verify the statement, "two successive rotations are additive". *5*

(b) What do you understand by the term 'Projection' in Computer Graphics ? Give the taxonomy (types) of projections. *5*

(c) Determine the final coordinates of a polygon ABCD, A (1, 4); B (– 4, 1); C (–1, –1); D (2, –2), when it is scaled up to twice its size with respect to an arbitrary point P (1, 1). 5

(d) Determine the perspective projection of an object at any arbitrary point (x, y, z) on z = 5 plane, with centre of projection at (0, 0, –10). Draw the diagram too. 5

4. (a) Determine two points on the cubic Bezier curve, whose control points are $p_0(0, 0)$; $p_1(5, 40)$; $p_2(40, 5)$; $p_3(50, 15)$. 5

(b) Explain Scanline method of visible surface detection in Computer Graphics. 5

(c) Discuss the term "Sweep Representations". Give suitable examples in support of your discussion. 5

(d) Briefly discuss the role of illumination models in Computer Graphics. How do Ambient, Diffused and Specular reflections contribute to the overall intensity of light ? Give mathematical expression for the same. 5

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

(i) Frame Animation and Sprite Animation

(ii) Scripting Systems and Parameterised Systems

(iii) Computer Generated and Computer Assisted Animation

(b) Give mathematical expression for simulating the following types of accelerations in animations :

(i) Zero Acceleration

(ii) Positive Acceleration

(iii) Negative Acceleration

Draw graphical plot for each illustrating the frame spacing. 6

(c) What are Authoring tools ? Give the characteristics of any two Authoring tools. 4

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

(i) Analog Sound

(ii) Digital Sound

(iii) Lossless Audio Formats

(iv) Lossy Audio Formats