C1-R4: ADVANCED COMPUTER GRAPHICS

NOTE:

1.	Answer question 1 and any FOUR from questions 2 to 7.
2.	Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours **Total Marks: 100**

1.

a) What do you understand by ray tracing? Explain briefly.

b) What is clipping? How is clipping done in three dimensional domains?

c) What is depth cueing? Explain with example.

d) Derive the transformation matrix for reflection about X-axis.

e) What is the difference between diffused and specular reflections?

f) Obtain the 3x3 transformation matrix for translating a point by (-1, 2). Calculate the inverse of this matrix and show that the result is a matrix which translates a point by (1, -2).

g) What are BSP trees and how do they compare with Octrees?

(7x4)

2.

a) What is the difference between active and passive transformation? Distinguish between uniform scaling and differential scaling? What is covering?

b) Illustrate the technique of bump mapping.

c) Write the three-dimensional transformation pipeline.

(7+8+3)

3.

a) What are the various representation schemes used in three dimensional objects?

b) Explain the integer Bresenham's line draw algorithm in two dimensions. Plot the trace of the line joining the following end points (-6, -3) and (4, 7).

c) Write down briefly the depth-buffer algorithm.

(6+6+6)

4.

a) What is Bezier Basis Function? What are the different ways of specifying spline curve? What are the important properties of Bezier Curve?

b) What is illumination? Explain the model used for illumination.

c) How is texture mapped on to surface of objects?

(8+5+5)

5.

a) What is rendering? What are the advantages of rendering polygons by scan line method?

b) Write the pseudo-code of Binary Space Partitioning tree algorithm for visible surface.

c) Illustrate the three perceived components of HSB color model. Give the formulae for transforming RGB to YIQ color model.

(6+6+6)

6.

a) What are the steps involved in 3D transformation? What is octrees? Give example of its use.

b) What is key frame system? Explain the term 'morphing'.

c) Consider a raster system with the resolution of 1024 x 768 pixels and the color palette calls for 65,536 colors. What is the minimum amount of video RAM that the computer must have to support the above-mentioned resolution and number of colors?

(6+6+6)

7.

a) What is an axonometric orthographic projection? Explain Back face detection method.

b) What is interlacing? Explain the utility of interlacing in display systems.

c) Explain Sutherland Hodgeman polygon clipping technique.

(6+6+6)