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) Define NURB giving an example.

b) Find the clipped coordinates of line A(-4,2)B(1,7) if the clipping windows bottom left corner is at (-3,1) and upper right corner is at (2,6).

c) What is an Octree? How can an Octree be used to represent a solid?

d) Define specular transformation? Derive the expression for the same using single source of light.

e) What do you mean by intensity attenuation? Give the technique for measuring the same.

f) Define additive and subtractive colors. Give an example of each.

g) What are the problems faced in animation while considering the time dimension?

(7x4)

2.

a) Explain the Sutherland-Hodgeman polygon clipping method with an example.

b) Draw the truncated view volume for orthographic and oblique parallel projections. Explain each.

c) What are the various ways to control the animation? Explain each to the point.

(6+4+8)

3.

a) Give the perspective projection of a part P(x, y, z) onto the plane z = d with centre of projection at (0, 0, 0).

b) Develop a transformation matrix for 3 D rotation about x-axis followed by rotation about y-axis. Does the order of rotation matter? Justify.

c) Explain the NTSC YIQ color model.

(6+6+6)

4.

a) Give the major characteristics of B-spline curve. How is it better then Bezier Curve?

b) What are the polygon mashes? Explain any 2 ways with examples.

c) Why is Phong shading methods called Interpolative shading methods? Explain the methods also.

(6+4+8)

5.

a) Describe Binary space partitioning method used to represent solids in 3D.

b) What do you mean by half tones and half tuning?

c) Describe the Z-buffer algorithms for hidden surface removal. Discuss its advantages and disadvantages.

(8+2+8)

6.

a) Derive the Blending Functions of Cubic Bezier Curve. Plot the 4 blending functions

b) What do you mean by controlling animation? List the various methods of controlling animation. Explain any two.

(9+9)

7.

a) Derive the geometry matrix for Hermite surface.

b) Describe how hidden surface removal and projection are integrated into the ray tracing system.

(9+9)