C1-R4: ADVANCED COMPUTER GRAPHICS

NOTE:

1. **Answer question 1 and any Four questions from 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 Orthographic Projection. Explain the construction of isometric & oblique projection.
b) Suppose you had a monitor that emitted light that was either cyan, magenta or yellow. How could you use this to create white light?
c) What is Cubic Bezier Curve? Mention its use in computer graphics.
d) Why are hidden surface algorithms needed? How does z-buffer algorithm determine which surfaces are hidden?
e) One important operation in quadtrees and octrees is finding a node's neighbor; that is, finding a node that is adjacent to the original node. How many neighboring nodes are possible in quadtree and octree?
f) Explain Half toning.
g) What is Kinematics and Dynamics in terms of Animation?

(7x4)

2.
a) Compare solid representation methods based on following criteria:
   Accuracy, Domain, Uniqueness, Validity, and, Closure
b) Prove that parallel lines in the world do not always appear as parallel lines with perspective projection.
c) Derive the transformation matrix for 45 degree rotation of a triangle A(0,0), B(1,1) C(5,2) about the origin.
   Hence give the transformation matrix for 45 degree rotation of the above triangle about the point P(-1,-1).

(6+4+8)

3.
a) Find the scaling transformation matrix to scale by sx, sy and sz units with respect to fixed point p(x, y, z).
b) Use the Cohen-Sutherland algorithm to clip line with points p1(70, 20) –p2(120, 60) against a window with diagonal points at a(50, 50), c(100, 100).
c) Explain Cell Decomposition Method for solid modeling.

(6+6+6)

4.
a) List out the properties of Bezier Curve.
b) What steps are required to fill a region using the boundary-fill method?
c) Mention Advantages and disadvantages of Z-buffer algorithm.

(8+5+5)

5.
a) What do you mean by Shading? Explain Phong's Shading Model, how is it better than Gouraud Shading?
b) Explain HSV color model. How is HSV model related to RGB mode?

(9+9)

6.

a) What do you mean by parametric continuity and geometric continuity? Show they are different types of continuities.

b) Derive the basis matrix for Cubic Hermite Curve.

c) Explain the general form of the Parametric Bi-cubic Surfaces.

(6+6+6)

7.

a) What are the basic rules of animation? Explain briefly.

b) What are the problems with textual languages for animation? Describe graphical animation languages for animation.

(9+9)