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.**

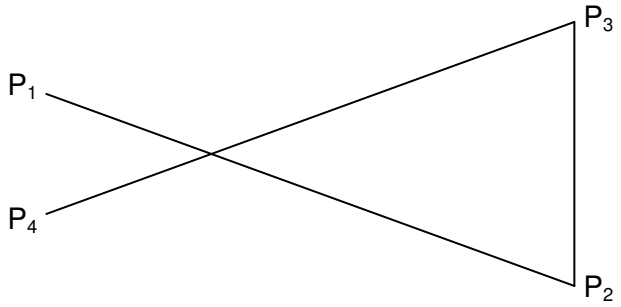
Time: 3 Hours **Total Marks: 100**

1.

a) Define rigid body transformation. Give an example.

b) Depict pictorially the truncated view volume for oblique parallel projection when VPN and DOP are not parallel to each other.

c) Draw by hand the Bezier Curve for the following control points, taken in



the order P_1, P_2, P_3, P_4.

d) What are the disadvantages of primitive instancing method of solid modelling?

e) Give the data structure used for representing valid solids using Octrees.

f) Give the light intensity attenuation formula and explain it.

g) Define additive and subtractive colors giving an example of each.

(7x4)

2.

a) What are the five basic logical devices categories? Explain briefly one in each category.

b) Derive the basis matrix for Hermite Curve.

c) What are the two types of sweep representations of solid modeling?

(7+7+4)

3.

a) Define B-Spline. What do you mean by Knot Values? Give the Knot Vector of uniform non rational spline.

b) Describe briefly CSG method with an example.

c) Derive the transformation matrix for the projection of a point (x, y, z) on the perspective projection plane $z=z_p$ with CoP at distance Q from $(0, 0, z_p)$. The direction from $(0, 0, z_p)$ to CoP is given by normalized direction vector (dx, dy, dz).

(5+4+9)

4.

a) Explain Apple's algorithm for visible line determination.

b) "Visible surface detection algorithms and shadow algorithms are essentially same." Explain.

c) Derive an expression for specular reflection for one point source of light.

(8+5+5)

5.

a) What are various ways of specifying motion in animation? Explain each one briefly.
b) What problem does YIQ color model solve for broadcasting TV?
c) Explain the four steps for designing animation.

(10+4+4)

6.

a) Explain HVS color model.
b) Find the perspective projection of (-1, -2, -3) onto the plane z=6 with centre of projection at (0, 0, -8).

(9+9)

7.

a) In 3D, tiling is defined as rotation about X-axis followed by rotation about Y-axis. What is transformation matrix for tiling? What is matrix of the angles of rotations and 450?
b) Describe briefly clipping in 3D using Cohen Sutherland Algorithm.

(10+8)