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) Generate the below given reflection matrices for 2-D transformation
   i) Reflection about an X-axis
   ii) Reflection about origin

b) Explain Phong Shading. What is the limitation of Phong Shading?

c) Which are the pros and cons with Z-buffer algorithm?

d) Explain the problem associated with interpolated shading?

e) Let (0, 0), (1, 2), (2, 1), (3, -1), (4, 10) and (5, 5) be given data points. Find a knot set x_0 …, x_9 that can be used to define the B-splines.

f) How do we morph a cuboid into a sphere?

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

(7x4)

2.

a) What is Bezier Basis Function? What are the different ways of specifying spline curves?

b) Show that 2-D reflection through X-axis followed by 2-D reflection through the line Y= -X is equivalent to a pure rotation about the origin.

c) What is BSP? How BSP trees are related to Octrees?

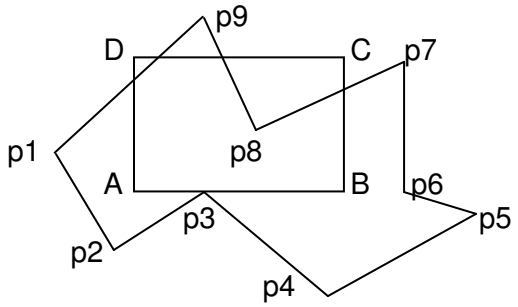
(6+8+4)

3.

a) Draw and explain the hierarchy of plane geometric projections

b) Explain the RGB color model.

c) Clip the given polygon P1, P2,……., P9 shown below against the window ABCD using Sutherland-Hodgeman algorithm.



(4+5+9)

4.

a) Explain what are various ways to control animation?

b) In 3-dimension tilting is defined as rotation about the x-axis followed by rotation about y-axis. Find the tilting matrix. If rotation about y-axis is performed before the rotation about x-axis then does the answer very?

c) Define Parallel Projections. What are the types of Parallel projections? Explain each type.

(6+6+6)

5.

a) Given P0[2,2], P1[4,6], P2[8,6] and P3[6,2], the vertices of of a Bezier polygon, determine seven points of Bezier curve.

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

c) Find the cubic polynomial that passes through the four points (1,2), (3/2, 31/16), (5/2, 11/16) and (3,1) and satisfies

$P(1) = 2$
$P(3/2) = 31/16$
$P(5/2) = 11/16$
$P(3) = 1$

(6+3+9)

6.

a) Explain in brief "applications and uses for solid representations".

b) What is Surface-Rendering? Explain Bump Mapping.

c) List the techniques for visible surface detection. Explain Z-buffer algorithm

(6+6+6)

7.

a) Animation control mechanisms range from full explicit control, to the highly automated control provided by knowledge-based systems. Describe methods to control the animation.

b) Binary Space Partition (BSP) tree is an efficient method for determining object visibility by painting surfaces onto the screen from back to front. Explain working of an algorithm.

c) What is Kinematics and Dynamics in terms of Animation?

(6+9+3)