No. of Printed Pages : **2**

Sl. No.

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) Why quaternion representation is considered the efficient technique for 3D rotation ?

(b) What are the differences between an orthographic and oblique projection ?

(c) Describe Homogeneous coordinate clipping.

(d) Explain the role of Parametric Continuity Conditions for ensuring a smooth transition from one section of a piecewise parametric curve to the next.

(e) Describe Phong Model for Specular Reflection.

(f) Using suitable example explain how dithering refers to techniques for approximating half tones without reducing resolution.

(g) Describe YIQ color model. **(7x4)**

2. (a) Draw General three-dimensional transformation pipeline, from modeling coordinates to final device coordinates. Explain the following terms related to it :

(i) view reference point

(ii) view-plane normal vector

(iii) view-up vector

(b) Given the three-dimensional point located at coordinates [3, 2, 2] in a right-handed cartesian system, what would its position be after rotation about the X axis by 30 degrees ?

(c) Clip the line AB ((25, 25), (35, 35)), PQ ((35, 45), (55, 20)) and XY ((5, 25), (20, 5)) against window (Xmin, Ymin) = (20, 30) and (Xmax, Ymax) = (50, 35) using cohen-sutherland algorithm. **(6+5+7)**

3. (a) What is the color 'gamut' for a CRT display ? How does it relate to the CIE chromaticity model ? What determines the color 'gamut' for a printer ?

(b) Most visible surface algorithms are applied after a perspective transformation and perspective division are applied. Why ? How is color usually handled in lighting calculations ? How are multiple light sources included in lighting calculations ? Give an example. **(9+9)**

4. (a) When polygons are specified with more than three vertices, it is possible that all the vertices may not Lie in one plane. Why ? How this problem can be solved ?

(b) Given the point [5, 3, 10], what is its orthogonal projection onto the x, y image plane ?

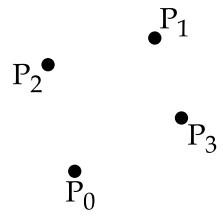
(c) Explain the types of Coherence and Application of Coherence in Visible Surface Detection Methods. **(4+6+8)**

5. (a) What are the various approaches to Speeding up the intersection calculation in ray casting ?

(b) Convert the CYM color [.52, .37, .5] to the equivalent CYMK color.

(c) Explain CIE Chromaticity Diagram in detail. **(6+4+8)**

6. (a) Sketch a Bezier curve between the below points. Both cubic B-splines and Bezier curves are approximation curves, although Bezier curves are computationally simpler. What is the advantage of cubic B-splines ? Consider P_0 M as starting control point.



(b) Explain HSV color model in detail. How does it differ from RGB color model ? **(9+9)**

7. (a) Write the advantages and disadvantages of z-buffer algorithm.

(b) Explain Rubber-Band Method and Dragging used for interactive picture construction.

(c) Clip the Polygon : (1000, 1500), (2000, 2500), (3000, 2000) against the Clipping Area : (1000, 3000), (3000, 3000), (2000, 1000) using Sutherland-Hodgman algorithm. **(5+5+8)**

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