

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) Propose the conversion from YIQ to HSI color model.
- b) How is Octree used for visible surface detections?
- c) What are the differences between local and global illumination?
- d) Describe Ambient Occlusion.
- e) Describe the 3D rendering pipeline.
- f) Describe Phong Shading Model.
- g) What is the use of antialiasing for rendering a 3D scene?

(7×4)**2.**

- a) Describe the full procedure for the simulation of particle generation.
- b) Explain the various types of projections with suitable diagram.

(9+9)**3.**

- a) Explain CSG (Constructive Solid Geometry) with example. Also elaborate on a few applications where CSG is commonly used.
- b) Convert from RGB to YCbCr colour model.

(9+9)**4.**

- a) Explain the differences between Z-Buffer Algorithm and the Painter's Algorithm for detecting hidden surfaces.
- b) Show that the normalized perspective to parallel transform NT_p preserves the relationships of the original perspective transformation while transforming the normalized perspective view volume into the unit cube.

(9+9)**5.**

- a) Derive the 3D Shearing matrix.
- b) Explain the Ray-object Intersection used in ray tracing algorithm.

(9+9)**6.**

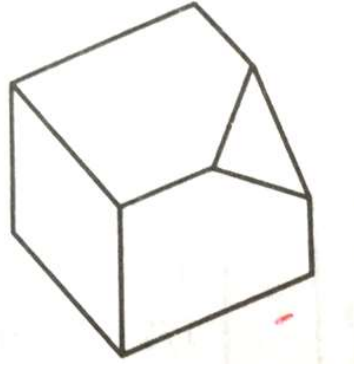
- a) Write short notes on:
 - i) Hermite Curve, &
 - ii) Text-clipping
- b) Explain the Visible Surface Ray Tracing Algorithm.

(9+9)

7.

a) Derive the equation for any cubic spline segment k.

b) A cube with one of its corner cut of (as shown in the figure) is formed by $\phi=30^\circ$ rotation about the y-axis, followed by a $\theta=45^\circ$ rotation about the x-axis and then parallel projected on $z=0$. Find the foreshortening ratios.



The position vectors for the cube with one corner removed are:

$$[X] = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0.5 & 1 & 1 \\ 0.5 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 0.5 & 1 \end{bmatrix}$$

(9+9)