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.**

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

1. (a) What are the various methods by which we can control animation ? Explain in detail.

(b) In which of the application areas the color model is found appropriate to use as compared with gray image ?

(c) What is the Bump Mapping ? How it can be used in computer graphics ?

(d) Write down the algorithm of Depth-sort. Explain each of the step in detail.

(e) Differentiate in between the Hermite curves and Bezier curves.

(f) Differentiate in between the 2D and 3D Geometric Transformations.

(g) Explain the use of the Space Partitioning trees in computer vision. List out some of the applications where it can be used. **(7x4)**

2. (a) Consider a unit cube whose opposite diagonal corners are placed at (0, 0, 0) and (1, 1, 1). The cube is rotated about y-axis by $\phi = -30°$, about x-axis by $\theta = 45°$ and then projected on to the $z = 0$ plane from the center of projection at $z = z_c = 4$. Find the composite perspective transformation matrix. Also find the principle vanishing points along all three principle axis.

(b) Derive the transformation matrix for oblique projection of coordinate position (x, y, z) to position (X_p, Y_p) on the view plane xy $(z = 0)$. **(10+8)**

3. (a) Define Polygon Mesh. Given a unit cube with one corner at (0, 0, 0) and the opposite corner at (1, 1, 1). Represent cube as pointers to vertex list and pointers to an edge list.

(b) What are the differences between regularized Boolean set operations and ordinary Boolean set operations ? Perform Boolean set operations on quadtrees by taking an example. **(9+9)**

4. (a) The position vectors for the vertices of a triangular surface are given by A(10, 0, 0), B(0, 10, 0) and C(0, 0, 10). A point light source is at P (0, 0, 20). Find the intensities at the vertices of the triangle if the ambient light intensity is 1 and the point light source intensity is 10. Assume Ka = Kd = 0.2 and light source attenuation = 1/d2. Neglect specular effect.

(b) List various shading models and explain each with its merits and demerits. **(12+6)**

5. (a) What is animation ? Briefly explain character animation and facial animation.

(b) What is direct motion specification ? Explain kinematics and dynamics in construction of animation sequences.

(c) What is key framing ? What are advantages of key framing ? **(6+6+6)**

6. (a) Explain any method for visible surface detection.

(b) Differentiate image precision and object precision. Describe Z-buffer algorithm for visible surface detection.

(c) Explain Back-face culling algorithm. **(6+6+6)**

7. (a) What is a color model ? How can be change the RGB to HSV color model ? Is HSV differ from HSI model ? Explain.

(b) Write short note. (**any three**)

(i) Halftone approximation

(ii) Constructive Solid Geometry (CSG)

(iii) Specular reflection

(iv) CMY color model

(v) B-Spline Curves **(9+(3+3+3))**

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