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B.E. (Computer Science and Engineering)
Fifth Semester
CS-502: Computer Graphics

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.*

x-x-x

I.   Write short answers of the following:-

   a) What is meant by differential seating? What is its effect?

   b) What is diffuse reflection and specular reflection?

   c) Differentiate between image space methods and object space methods for hidden surface elimination.

   d) What is horizontal retrace and vertical retrace?

   e) What are cabinet and cavalier projections?   (5x2)

UNIT –I

II.   a) Explain in detail midpoint algorithm for scan converting a circle. Derive expressions for the decision parameters.

   b) Making use of Bresenham's algorithm, find the coordinates of pixels that lies on a line segment having endpoints (10, 12) and (16, 16).   (10)

III.   A) Perform a 45° rotation of triangle A (0,0), B(1.1), C(5,2) about the point P(-1,-1).

   b) Describe in detail Sutherland-Hodgeman polygon clipping algorithm. What is the problem that this algorithm encounters when applied on concave polygons.

IV.   a) Find a normalization transformation from the window whose lower left corner is at (0,0) and upper right corner is at (4,3) onto the normalized device screen so that aspect ratios are preserved.

   b) Describe in detail various application areas of computer graphics.   (10)

UNIT – II

V.   a) What do you mean by hidden surface? Why is it removed? Describe in detail scan line method for hidden surface elimination.

b) Derive the general perspective transformation onto a plane with reference point $R_0(x_0, y_0, z_0)$, normal vector $N = n_1 l + n_2 j + n_3 K$, and using $C\ \{a,b,c\}$ as the centre of projection. (10)

VI.   a) Find the matrix for mirror reflection with respect to the plane passing through the origin and having a normal vector whose direction is $N = I + \boldsymbol{J} + K$.

b) Describe in detail Phong's method for smooth shading. (10)

VII.   Write short notes on:-

a) Properties of Bezier Curves

b) Computer Animation (10)

x-x-x