

2021  
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:-
- What are emissive and non-emissive displays?
  - Prove that uniform scaling and rotation form a commutative pair of operations.
  - What are cabinet and cavalier projections?
  - What are the properties of a good line drawing algorithm?
  - State various properties of Bezier curves. (5x2)

**UNIT – I**

- II. a) Derive the decision parameter expressions for Bresenham line drawing algorithm. Write Bresenham line drawing algorithm and explain how it is better than DDA algorithm for line generation.
- b) Indicate which raster locations would be chosen by Bresenham's algorithm when scan- converting a line from pixel coordinate (1,1) to pixel coordinate (8,5). (5,5)
- III. a) Describe Weiler Atherton polygon clipping algorithm. How this algorithm is an improvement over Sutherland Hodgeman algorithm for polygon clipping.
- b) Find the transformation matrix which converts a square with diagonal (3,4) and (8,9) to a unit square at origin. (5,5)
- IV. a) Describe Liang-Barsky line clipping algorithm in detail. Find the visible portion of the line segment with end points (0,10) and (30,30) against the windows having diagonally opposite corner as (5,0) and (15,15).
- b) Write 8-boundary fill algorithm. If a boundary is 8-connected, can 8-boundary fill algorithm be used to fill the region bounded by that boundary? If no, why? (5,5)

P.T.O.

(2)

**UNIT – II**

- V. a) Describe depth buffer method for hidden surface elimination.  
b) Find the matrix for mirror reflection with respect to the plane passing through the origin and having a normal vector whose direction is  $N = I + J + K$ . (5,5)
- VI. a) Describe in detail Phong's method for smooth shading.  
b) Drive the equation of parallel projection onto the xy plane in the direction of the projection vector  $V = aI + bJ + cK$ . (5,5)
- VII. Write short notes on:-  
a) B-Splines and their properties  
b) Flat shading and smooth shading (5,5)

x-x-x