

## Computer Graphics

N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Assume **suitable** data if **necessary** and justify the **same**.

1. (a) Explain Liang Barsky line clipping algorithm and hence find the clipping candidates of line AB with end points (7,5) and (9,7), window boundaries given are (4,4) and (10,9). 10
- (b) Clearly differentiate between random scan and raster scan system. 5
- (c) Explain even-odd test to determine whether point is inside or outside of polygon. 5
2. (a) Explain Midpoint ellipse algorithm with all required mathematical representation. 12
- (b) Explain scan line area conversion algorithm with suitable example. 8
3. (a) Prove that – 10
  - (i) 2D rotation and scaling commute if  $s_x = s_y$  or if  $Q = n\pi$  for integral  $n$  and that otherwise it do not.
  - (ii) Two successive rotations are additive i.e.  $R(Q_1)R(Q_2) = R(Q_1 + Q_2)$ .
- (b) What is window and viewport. Assuming the window and viewport to be rectangular, derive the steps and the respective transformation matrix for transforming a point  $(x_w, y_w)$  in a window to point  $(x_v, y_v)$  in viewport. 10
4. (a) Explain Sutherland Hodgmann polygon clipping algorithm with example. 10
- (b) Explain Warnock's algorithm used to remove hidden surfaces with example. 10
5. (a) Give properties and mathematical equations for Bezier curve. Given the vertices of Bezier polygon as :  $P_0(1,1)$ ,  $P_1(2,3)$ ,  $P_2(4,3)$  and  $P_3(3,1)$ , determine five points on Bezier curve. 12
- (b) Explain and compare boundary fill and flood fill algorithm. 8
6. (a) Explain Parallel and perspective projections. Derive the matrix for perspective projection. 10
- (b) What do you mean by segment? What are the various attributes in segment table? State which operations can be done on segments and explain the same. 10
7. Write short notes on the following any **four** :- 20
  - (a) Fractals
  - (b) Specular Reflection
  - (c) Gouraud Shading
  - (d) Dithering Techniques
  - (e) Half Toning
  - (f) Color Models.