

[This question paper contains 4 printed pages.]

Your Roll No. ....

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**MECTA**

**COMPUTER TECHNOLOGY AND APPLICATIONS**

Paper—CS.601

Computer Graphics

Time : 3 Hours

Maximum Marks : 100

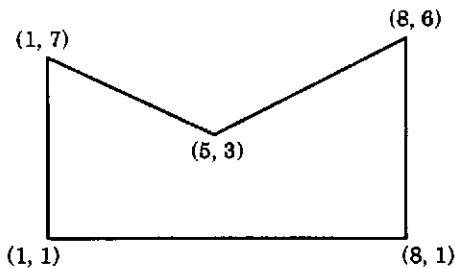
*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Attempt any Five questions.*

1. (a) If we use 2 byte pixel values in a 24-bit look-up table representation, how many bytes does the look-up table occupy ? 4
- (b) Discuss the Beam Penetration method and Shadow Mask method used in colour CRT monitors. 8
- (c) Write midpoint algorithm to scan convert a circle and using this algorithm scan convert a circle with radius 12 and centre at (1, 2). 8
2. (a) Compute the transformation matrix to reflect an object about an arbitrary line  $y = mx + c$ . 8
- (b) Reflect the object defined by the co-ordinate A (-1, 0), B (0, - 2) and C (1, 0) about the line  $y = x + 2$ . 4

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- (c) Find the condition under which we can switch the order of rotation and simultaneous shearing and still get the same result. 4
- (d) What is aliasing ? Explain different methods of minimising its effect. 4
3. (a) What are the steps required to fill the polygon using scan line algorithm? 5
- (b) What is odd-even parity rule used in filling of closed regular objects? Explain with example. 5
- (c) Using scan line algorithm determine which pixels would be put ON to fill the following polygon :



6

- (d) Explain the following :
- (i) Scan line coherence 4
- (ii) Edge coherence.
4. (a) Explain the Liang-Barsky algorithm to clip the line segment. 8
- (b) Using the Liang-Barsky algorithm clip the following lines between :

(i) (6, 6) and (8, 9), and

(ii) (11, 6) and (11, 10).

When the window is described by diagonal points  
(1, 2) and (9, 8). 6

(c) What are Hermite splines ? Find the coefficient  
matrix for Hermite splines. 6

5. (a) Find a transformation  $A_V$  which aligns a given vector  
 $V = ai + bj + ck$  with the vector  $k$  along the +Z-axis.  
8

(b) Explain the following :

(i) Principal vanishing points.

(ii) Axonometric Projection. 4

(c) Derive the general parallel projection onto a given  
view plane in the direction of a given projector  
 $V = ai + bj + ck$ . The view plane is described by  
normal  $N = n_1i + n_2j + n_3k$  and reference point  
 $R_0(x_0, y_0, z_0)$ . 8

6. (a) Explain the following Hidden Surface Elimination  
methods : 8

(i) Scan-Line Method

(ii) BSP Tree Method

(b) Explain Gouraud Shading technique. Discuss its  
advantages and disadvantages. 6

- (c) Explain the following : 6
- (i) Specular Reflection
  - (ii) Diffuse Reflection
  - (iii) Octrees
7. Write short notes on any *four* : 20
- (a) 2-D viewing
  - (b) Midpoint Ellipse Algorithm
  - (c) Weiler Athertor Algorithm
  - (d) Bezier Curves
  - (e) Solid Modelling
  - (f) Oblique Projection