



Sl. No. of Ques. Paper	: 6193	F-5
Unique Paper Code	: 2341503	
Name of Paper	: Computer Graphics	
Name of Course	: B.Tech. Computer Science	
Semester	: V	
Duration :	: 3 hours	
Maximum Marks	: 75	

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

The question paper consists of two Sections. Section A is compulsory.
Attempt any four questions from Section B.

SECTION A

- (a) Consider a raster system with a resolution of 250×250 . For a 10×11 screen, find the radius of each pixel. 3

(b) What is interlacing? 2
- (a) Differentiate between DDA and Bresenham Line Drawing algorithm. 3

(b) Discuss any two methods to draw a thick primitive. 2
- (a) Give the structure of Global Edge table used in Polygon filling algorithm. 2

(b) Prove that two successive scaling operations are commutative. 3
- (a) Show that the following 2d matrix represents a pure rotation: 3

$$\begin{bmatrix} \frac{1-t^2}{1+t^2} & \frac{2t^2}{1+t^2} \\ \frac{-2t}{1+t^2} & \frac{1-t^2}{1+t^2} \end{bmatrix}$$

(b) What is the value of Center of Projection w.r.t. parallel and perspective projection? 2
- (a) Give the 3D rotation matrices for rotation by α , β and γ about X-axis, Y-axis and Z-axis respectively. 3

(b) Why is depth sort algorithm also known as Painter's algorithm? 2

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6. (a) What are the properties of Bezier curve? 2
(b) What do you mean by ambient reflection and diffuse reflection? 3
7. (a) What is the difference between Y in CMY and Y in YIQ color models respectively? 2
(b) How does the frame spacing control the motion simulated in an animation scene? 3

SECTION B

8. (a) Indicate raster positions that would be chosen while scan converting region 1 of an ellipse with major axis as 8 and minor axis as 5. The ellipse is centered at origin. 6
(b) Briefly explain the working of Liquid Crystal Display. 4
9. (a) Use the Cohen Sutherland algorithm to clip line P1 (70, 20) and P2 (100, 10) against a window lower left hand corner (50, 10) and upper right hand corner (80, 40). 6
(b) Consider the polygon with vertices A (2, 3), B (8, 3), C (8, 6), D (10, 6), E (10, 9) and F(5, 9). Write steps to fill this polygon using Odd-Parity rule. 4
10. (a) The coordinates of square ABCD are A (0, 0), B (0, 4), C (4, 4), and D (4, 0). Scale it to half the size w.r.t. the fixed point that is the center of the square. 5
(b) What are rigid body transformations? Determine the conditions under which the generalized 2×2 transformation matrix represents a rigid body transformation. 5
11. (a) Write the 3D transformation matrices for the following:
(i) Uniform scaling by a factor of 2 w.r.t. the fixed point (1, 1, 2, 1). 3
(ii) Translation right by 2 units and up by 4 units. 2
(iii) Rotate about X-axis by 30° followed by rotation about z-axis by 45° 2
(iv) Two-point perspective projection on $z=0$ plane with Centre of Projection (COP) lying on X-axis as 2.0 and COP lying along y-axis as -1.0. 3



12. (a) Given a sequence of control points $p_0 (0, 0, 0)$, $p_1 (1, 2, 0)$, $p_3 (3, 1, 0)$. Write a formula for the Bezier curve formed from above three points. Use the formula to calculate the point $t = 1/3$ and the tangent at that point. 5
- (b) Define morphing. Specify the rules to equalize the set of edges in key frames K and $K + 1$. 5
13. (a) Differentiate between halftoning and dithering. 4
- (b) List the data structures used in Z-buffer algorithm for visible surface determination, along with the description of the values stored in them. 3
- (c) Briefly explain the Gourand shading model. 3

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