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This question paper contains 4 printed pages.

Your Roll No.

S. No. of Paper : 6516 HC
Unique Paper Code : 32341602
Name of the Paper : Computer Graphics
Name of the Course : B.Sc. (Hons.) Computer Science
Semester : VI
Duration : 3 hours
Maximum Marks : 75

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

*The paper has two Sections. All questions in Section A are
compulsory. Attempt any four questions from Section B.*

Parts of a question must be answered together.

Section A

1. (a) What is the condition for trivial acceptance of a line segment PQ with P(0, 2) and Q(4, 2) in Cohen Sutherland Line Clipping Algorithm using rectangular window defined by vertices A(0, 0), B(4, 0), C(4, 4), and D(0, 4)? 3
- (b) What is the advantage of convex hull property in Bezier curve? 3
- (c) Define aspect ratio. If an image has a height of 2 inches and an aspect ratio of 1.5, what is its width? 3
- (d) How do we specify animation sequence using kinematic and inverse kinematic description? 3
- (e) Explain why a RGB color model is an additive color model. How can YIQ be obtained from 3

P. T. O.

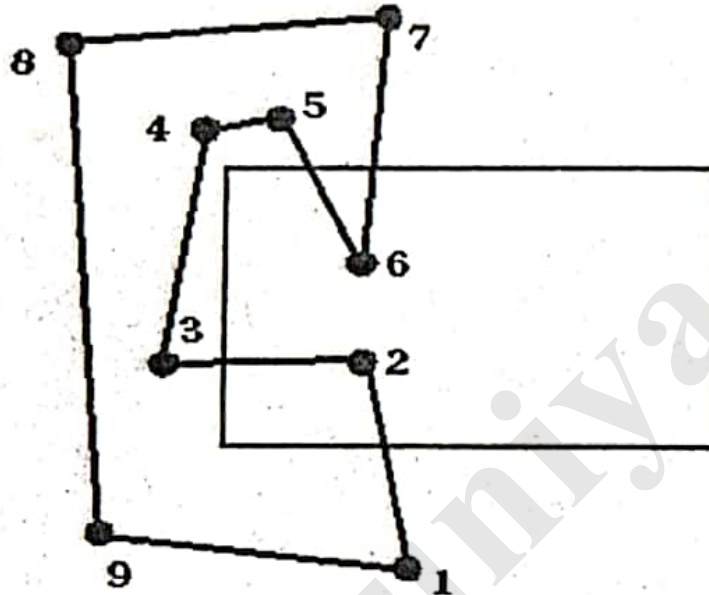
RGB?

- (f) Give two reasons why Z_c buffer algorithm for visible surface determination is a fast algorithm. 3
- (g) Consider the triangle ABC with A(0, 0), B(5, 0), and C(0, 5). Give transformation matrix after shearing triangle ABC by 3 units along Y-axis and 4 units along X-axis, using homogeneous coordinates. 3
- (h) What is the difference between Phong shading and Gouraud shading? 3
- (i) List any three logical input-device classifications used by the graphics systems, giving one example of each. 3
- (j) Consider a polygon with vertices ABCD with coordinates A(1, 2), B(5, 5), C(8, 3) and D(5, 10). Trace the contents of Active Edge Table according to scan line fill algorithm. 3
- (k) What are the advantages of using homogeneous coordinates? 3
- (l) Give the transformation matrix for perspective projection onto the $z=0$ plane from center of projection at $z = -5$. 2

Section B

- 2. (a) Mention all possible vanishing points and draw a diagram of three points perspective projection. 4
- (b) Given an ellipse with major axis = 16 units and minor axis = 12 units. Determine first 6 raster positions along the ellipse path, considering the initial raster position at (0, 6). 6
- 3. (a) Explain Gouraud shading method for polygon rendering with its drawbacks. 4

- (b) Draw the four stages of the Sutherland-Hodgeman clipping algorithm as the polygon shown below is clipped by the right, top, left, and bottom clip rectangle edges.



4. (a) Consider a rectangle $A(-1, 0)$, $B(1, 0)$, $C(1, 2)$ and $D(-1, 2)$. Rotate the rectangle about the line $y=0$ by an angle $\alpha=45^\circ$ using homogeneous co-ordinates. Give the new co-ordinates of the rectangle after transformation.
- (b) Prove that parallel lines remain parallel after generalized 2D transformation.
5. (a) Define hue, intensity, saturation and purity of light with respect to color models.
- (b) Develop cavalier and cabinet oblique projection on a unit cube, assuming one of the parameters $\alpha=30^\circ$.

6. (a) Derive the Basis Matrix for parametric cubic Bezier Curves. Also, obtain its blending functions. 5
- (b) List the five ambiguities that may arise in the depth sort algorithm of hidden surface removal when the polygon's Z extents overlap. 5
7. (a) Specify the rules to equalize the set of edges in key frames k and $k+1$ in an animation scene. Using these rules, transform a triangle into a pentagon. 5
- (b) Does Liquid Crystal Display (LCD) fall under the category of non-emissive displays? Does it support raster scan display? Explain its working with a diagram. 5

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