This question paper contains 4 printed pages.

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   3
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)?

   (b) What is the advantage of convex hull property in   3
Bezier curve?

   (c) Define aspect ratio. If an image has a height of 2   3
inches and an aspect ratio of 1.5, what is its width?

   (d) How do we specify animation sequence using   3
kinematic and inverse kinematic description?

   (e) Explain why a RGB color model is an additive   3
color model. How can YIQ be obtained from

P. T. O.

RGB?

(f) Give two reasons why Z 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 co-ordinates 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. 6
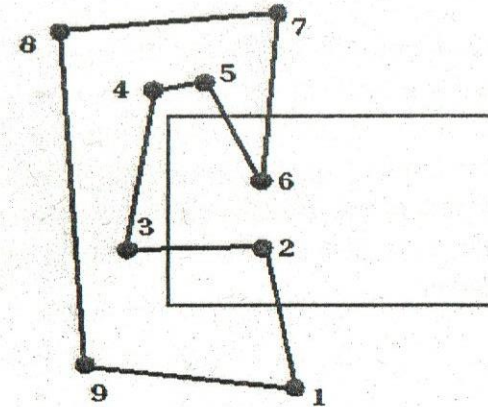
4. (a) Consider a rectangle A(-1, 0), B(1, 0), C(1, 2) and D(-1, 2). Rotate the rectangle about the line $y=0$ by an angle $\alpha=45^0$ using homogeneous co-ordinates. Give the new co-ordinates of the rectangle after transformation. 6

(b) Prove that parallel lines remain parallel after generalized 2D transformation. 4

5. (a) Define hue, intensity, saturation and purity of light with respect to color models. 4

(b) Develop cavalier and cabinet oblique projection on a unit cube, assuming one of the parameters $\alpha= 30^0$. 6

P. T. O.

6. (a) Derive the Basis Matrix for parametric cubic 5
        Bezier Curves. Also, obtain its blending functions.

   (b) List the five ambiguities that may arise in the 5
        depth sort algorithm of hidden surface removal
        when the polygon's Z extents overlap.

7. (a) Specify the rules to equalize the set of edges in key 5
        frames k and $k+1$ in an animation scene. Using
        these rules, transform a triangle into a pentagon.

   (b) Does Liquid Crystal Display (LCD) fall under the 5
        category of non-emissive displays? Does it support
        raster scan display? Explain its working with a
        diagram.