

[Total No. of Questions:12]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**  
**[4362]-223**  
**S.E. (Information Technology)**  
**Examination-2013**  
**(Computer Graphics)**  
**(2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 Answer three questions from Section I and III questions from section II.
- 2 Answers to the two sections should be written in separate answer-books.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Black figures to the right indicate full marks.
- 5 Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6 Assume suitable data, if necessary.

**SECTION I**

- |           |    |   |     |
|-----------|----|---|-----|
| Q.1       | a. | Consider the line from (5,5) to (13,9). Use the Bresenham's algorithm to rasterize the line.                                  | [8] |
|           | b. | Explain filtering technique for anti-aliasing   | [4] |
|           | c. | Explain raster scan display   | [4] |
| <b>OR</b> |    |   |     |
| Q.2       | a. | Explain the term display file and display file interpreter. Explain two data structures for implementing display file.        | [8] |
|           | b. | Explain DDA line drawing algorithm along with its advantages and disadvantages.   | [8] |
| Q.3       | a. | Give 2D transformation matrices for translation and scaling. Prove that two successive 2D-rotations about the origin commute. | [8] |
|           | b. | Explain flood fill algorithm for filling polygons   | [8] |
|           | c. | Give the homogeneous coordinate transformation matrix for counter clockwise rotation about the origin by 90degrees.           | [2] |

**OR**

- Q.4      a.      Find the reflection of a point A[5,9] about the line  $y=x+5$  [10]  
            b.      Find the transformation matrix that transforms the given square ABCD to half its size with centre still remaining at the same position. The coordinates of square are: A(1,1), B(3,1), C(3,3), D(1,3). Also find resultant coordinates of square. [8]
- Q.5      a.      Explain parallel projections and perspective projection in detail. [8]  
            b.      Give examples one for each case of 3D objects having [8]  
                    i)      Never a vanishing point,  
                    ii)     at most one vanishing point,  
                    iii)    at most two vanishing point,  
                    iv)    at most three vanishing points.

**OR**

- Q. 6      a.      Explain general parallel projection onto a given plane. [8]  
                    The view plane passes through a point  $V(x_0, y_0, z_0)$  and normal to the view plane is given by  $N=n_1i+n_2j+n_3k$ . The direction of projection is given by vector  $V=a_i+b_j+c_k$ . Give your answer stepwise along with transformation matrix at each step.  
            b.      Write short note on (any two) [8]  
                    i>      Polygon inside Test  
                    ii>     Joystick  
                    iii>    Polygon meshes

**SECTION II**

- Q. 7      a>      Explain HSV and YIQ colour models [10]  
            b>      Explain in detail the steps for designing animation sequences [8]

**OR**

- Q.8      a>      Explain different methods of controlling animation [8]  
            b>      Write short notes on [10]  
                    i>      Colour mixing  
                    ii>     RGB colour model
- Q.9      a>      What is Jittering? State the advantages of distributed ray tracing. [4]  
            b>      Explain diffuse reflection [4]  
            c>      What is the basic purpose of ray tracing algorithm? [8]  
                    Explain ray tracing to find shadows

**OR**

- |      |    |   |     |
|------|----|---|-----|
| Q.10 | a> | Compare Gouraud and Phong's method of shading     | [8] |
|      | b> | Explain Specular reflection with figure in detail | [8] |
| Q.11 | a> | Explain cubic spline interpolation methods        | [8] |
|      | b> | Explain in brief Monte-Carlo method for rendering | [8] |

**OR**

- |      |    |   |     |
|------|----|---|-----|
| Q.12 | a> | How fractals are used to generate fractal surfaces?<br>Give two examples of fractal surfaces. | [8] |
|      | b> | Write a short note on (any two)   | [8] |
|      |    | i> GPU  |     |
|      |    | ii> Quadratic Surfaces  |     |
|      |    | iii> Texture Mapping  |     |