

Time: 3 Hours

JUNE 2017

Max. Marks: 100

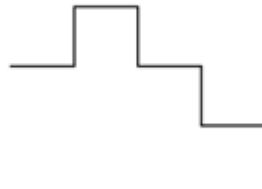
PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

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- Q.1**
- While drawing a circle, co-ordinates of only one eighth of the total pixels lying on circumference of a circle are computed. Why?
 - Derive the transformation matrix for reflection of a point along the line inclined at an angle of -45 degrees with positive direction of X-axis.
 - What are the naming conventions in OpenGL for command name, constant and function.
 - Prove that three successive 2D-rotations are associative i.e.
 $R(\theta_1) [R(\theta_2) R(\theta_3)] = [R(\theta_1) R(\theta_2)] R(\theta_3)$
 - What is vanishing point? Which type of projections uses vanishing point?
 - What are sweep translations? Explain.
 - Frame buffer is required in graphics rendering. What is frame buffer and rendering process? (4×7)
- Q.2**
- Write Scan line filling algorithm and use the algorithm to fill the inside area of the polygon bounded by (1, 1), (4, 4) and (7, 1). (9)
 - Write the midpoint circle generating algorithm. (9)
- Q.3**
- Derive a transformation matrix to rotate a line $3y = 4x + 5$ by 45° about the straight line $4y = 3x + 6$. (9)
 - Explain how hidden surface elimination is carried out using the scan line method (9)
- Q.4**
- What is the Parametric Sweeping? Give the derivation of solving any point on the surface using Bezier curve. (12)

- b. Write two advantages of B-splines over Bezier curve. (3)
- c. Define uniform periodic B-spline, give an example. (3)
- Q.5** a. What are the issues involved in 3D clipping? How is it different from 2D clipping? Describe any one algorithm to clip 3D object. (9)
- b. Find the coordinates of the pyramid, whose coordinates are defined as P(0,0,0), Q(1,0,0), R(0,1,0), S(0,0,1) after the mirror reflection with respect to the plane passing through the point Q(0,1,0) and having a normal vector whose direction is $N = i + j + k$. (9)
- Q.6** a. How visible surface determination is done? Explain the painter's algorithm for detecting combined object and image space. (10)
- b. What is animation? What are the different methods to produce real time animation? (8)
- Q.7** a. What is fractal dimension? How is it determined? Calculate the dimension of fractal with generator.



and one segment length = $1/3$. (6)

- b. Define with examples the three groups of fractals. (6)
- c. Write a short note on OpenGL. (6)