GANPAT UNIVERSITY

M. Tech. Semester-I Mechanical Engineering (CAD/CAM)

Regular Examination Nov-Dec 2017

3ME111 Computer Aided Design

Time: 3 Hours

Total Marks:60

Instructions: 1. This Question paper has two sections. Attempt each section in separate answer book.
2. Figures on right indicate marks.
3. Be precise and to the point in answering the descriptive questions.
4. Assume suitable data if necessary.

Section - I

Que. – 1   **Attempt all questions.**

(a) Find out the raster location to draw a line from point (1, 0) to (7, 3) by using Bresamham algorithm.   [04]

(b) Write a C programme to draw upper half circle on raster display.   [04]

(c) Explain Raster scan display and Frame Buffer with net sketch.   [03]

OR

Que. – 1   **Attempt all questions.**

(a) Determine the pixel position on graphical display to draw circle which having center (2, 2) and radius 10 using Mid-point algorithm.   [04]

(b) Write a C program to draw a line between points P (1, 3) and Q (10, 6) by using Bresamham's algorithm.   [04]

(c) What is scan conversion? Explain Bresenham's algorithm for scan converting a circle.   [03]

Que. – 2   **Attempt all questions.**

(a) Explain Bezier surface and Ruled surface with neat sketch.   [04]

(b) Plot the hermite cubic curve having endpoints P_0 (1, 3) and P_1 (7, 2). The tangent vector for end P_0 is defined by a line joining P_0 and another point P_2 (10, 8), whereas the tangent vector for end P_1 is defined by a line joining P_1 and another point P_3 (6, 0).   [06]

OR

Que. – 2   **Attempt all questions.**

(a) What is wire frame modeling? Write its applications.   [04]

(b) Plot the Bezier curve having endpoint P_0 (0, 0) and P_3 (7, 0). The other control points are P_1 (7, 0) and P_2 (7, 6). Plot for values for u = 0, 0.1, 0.2 … 0.6, if the characteristic polygon is drawn in the sequence P_0-P_1-P_2-P_3.   [06]

Que. – 3   **Attempt any Three questions**   [09]

(a) What are the characteristics of Bezier curve?

(b) Explain the terms geometry and topology for a solid model.

(c) With an example, explain the formation of a CSG tree.

(d) Explain B-spline surface with neat sketch.

Que. – 4   **Attempt all questions.**
   (a) Explain Graphics standard PHIGS.   [05]
   (b) Explain the reverse engineering process.   [05]

OR

Que. – 4   **Attempt all questions.**
   (a) Explain Graphics standard DXF.   [05]
   (b) What is reverse engineering? How it use in Rapid prototyping for part generation.   [05]

Que. – 5   **Attempt all questions.**
   (a) A triangle ABC has vertices as A (4, 4), B (6, 7) and C (8, 5). It is desired to reflect through an arbitrary line y = 0.5 x + 3. Calculate the new vertices of triangle.   [04]
   (b) A rectangle ABCD has vertices A (1, 1), B (2, 1), C (2, 3) and D (1, 3). It has to be rotated by 30^0 CCW about point P (3, 2). Determine: [03]
        a) The composite transformation matrix.
        b) The new coordinates of rectangle.
   (c) A triangle ABC having coordinates A (3, 4, -2), B (-4, 6, 3) and C (-6, 4, 3) is to be rotated about the X axis by 20^0 anticlockwise. Determine the new coordinates of the triangle.   [04]

OR

Que. – 5   **Attempt all questions.**
   (a) A square with an edge length of 10 units is located on the origin with one of the edge at an angle of 30^0 with the +X axis. Calculate the new position of the square if it is rotated by an angle 30^0 in the clockwise direction.   [04]
   (b) A triangle formed by three point A, B and C whose coordinates are A (50, 40), B (100, 60), C (70, 80). Calculate the new coordinates if the triangle is reduced in size using the scale factors $S_x = 0.5$, $S_y = 0.7$ and base point is A.   [03]
   (c) A line has coordinates A (5, 4, 5) and B (8, 7, 9). The line is to be uniformly scaled by a factor 2 about point A. Determine the new coordinates of the line.   [04]

Que. – 6   **Attempt any Three questions**   [09]
   (a) Prove the a uniform scaling and a rotation form a commutative pair of operations, but that in general scaling and rotation are not commutative.
   (b) Write a short note on transformation matrix for perspective projections.
   (c) Write a Matlab Program for rotation about point A (3, 3).
   (d) What are homogeneous coordinates systems? Write the matrix transformation in homogenous form for rotation and reflection.

END OF PAPER