

GANPAT UNIVERSITY
M.Tech. Sem. Ist (CAD-CAM)
Regular Examination Dec. 2013
3ME 113 Computer Aided Design

Time: 3 Hrs

Marks: 70

Instructions:

- (i) All questions are compulsory.
- (ii) Answers to two sections must be written in separate answer books.
- (iii) Assume suitable data if required but state them clearly in your answer-books.
- (iv) Figure to the right indicates full marks.

SECTION – I

Q1 Answer the following Questions.

- (a) What is ICG? Explain in detail. 3
- (b) Prepare program for polynomial circle. 4
- (c) Why Homogeneous transformation matrix is useful? Explain homogeneous all terms with their usefulness. 3
- (d) Differentiate Raster Scan Display and Vector Scan Display. 2

OR

Q1 Answer the following Questions.

- (a) State the considerations that should be taken care of while identifying design variable for a problem. 12
- (b) Derive decision variables for Bresenham's circle algorithm.
- (c) End point of line are (10, 18) and (16, 25). Find pixels by using DDA method.

Q2 Answer the following Questions. 12

- (a) Differentiate between parametric and non parametric generation of curves.
- (b) $P_0[10 \ 8 \ 0]$, $P_1[18 \ 6 \ 0]$, are data point of cubic curve and $P_0'[2 \ 2 \ 0]$, $P_1'[5 \ 2 \ 0]$ are tangent vector of end points. Find out intermediate three points.
- (c) Prove that in case of 2D transformation of a triangle ABC, result obtained after it being reflected about the X axis first and then about line $Y = -X$ will be same as when the triangle is rotated about the origin by an angle 270° .

OR

Q2 Answer the following Questions. 12

- (a) Write down the algorithm (steps) for object rotation about any arbitrary line in space.
- (b) Write program for parabola by trigonometric method.
- (c) Derive the cubic curve equation in form of a matrix.

Q3 Write answers on following. 11

- (a) Define i) feature ii) Primitives iii) Homogeneous coordinate
- (b) Why solid modelings require more memory? Explain CSG solid modeling techniques.
- (c) Explain characteristics of Bazier surface.

SECTION – II

- Q4** Answer the following Questions. 12
(a) Explain in Brief GKS, PHIGS.
(b) Derive the Bazier curve in the matrix form, illustrating the control points, the curve shape, through sketches.

OR

- Q4** Answer the following Questions. 12
(a) Discuss the impact of CAD in traditional Mechanical Design in industries.
(b) Given a square planar sheet ABCD in the x-y plane with A (1, 0, 0), B (1, 1, 0), C (0, 1, 0) and D (0, 0, 0), find the perspective image of the sheet on $y = 0$ plane, with the view point at $y_p = 2$. The sheet is rotated 60° about the z-axis and translated -2 units along z-axis.

- Q5** Answer the following Questions. 12
(a) What is number synthesis? Explain its importance enumerate all chain possible with $n=6$ and one degree of freedom.
(b) Determine the three point chebyshev spacing for the function $y = x^2$ $0 \leq X \leq 10$
Also find θ_j, ψ_j for $j = 2, 3$ if $\Delta \theta = \Delta \psi = 60^\circ$

OR

- Q5(a)** Determine the Chebyshev spacing for the function $y = e^x$ for $0 \leq X \leq 4$ and specified three precision points. Using Chebyshev spacing, determine : 12
(a) X_1, X_2 and X_3
(b) θ_j, ψ_j ($j = 2, 3$) for $\Delta \theta = 80^\circ$ and $\Delta \psi = 110^\circ$
(b) Layout a four bar mechanism such that $\theta_{12} = 45^\circ$ and $\psi_{23} = 65^\circ$. It may be assumed that in out crank moves in counter clockwise direction while the output link moves in a clockwise direction.

- Q6** Write answers on following. 11
(a) "A prismatic pair can always be thought of as the limit of a revolute pair "Justify the statement.
(b) Explain need of graphics standards. Write short note on "IGES".