GANPAT UNIVERSITY

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

Regular Examination Nov-Dec 2016

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)	Write down steps for object mirror about any arbitrary line in plane.	[04]
	(b)	What is Homogenous Coordinate System? Write the basic transformation matrix in homogenous coordinate system.	[03]
	(c)	Write a Matlab program for 30° CCW rotation of rectangle.	[03]

OR

Que. – 1		**Attempt all questions.**	
	(a)	Show that the composition of two rotation is additive by concatenating matrix representations for $R(\Theta_1)$ and $R(\Theta_2)$ to obtain: $R(\Theta_1) \times R(\Theta_2) = R(\Theta_1 + \Theta_2)$	[04]
	(b)	A cube has 1 mm³ volume. Using transformations, determine the coordinate of the perspective view in the viewing plane, when the cube is seen from a distance of 30 mm along the Z axis.	[03]
	(c)	Write a Matlab program and gives output for 2D Reflection of triangle with respect to x= -y line.	[03]

Que. – 2		**Attempt all questions.**	
	(a)	A triangle ABC has vertices A (1, 3), B (2, 5) and C (6, 6). It has to be rotated by 60° CCW about point P (-1, 3). Determine (i) the composite transformations of matrix and (ii) the new coordinates of triangle.	[04]
	(b)	A triangle formed by three points A, B and C whose coordinates are A (50, 40), B (100, 60), C (70, 80). Calculate the new coordinates of the triangle in reduced size using scaling factors $S_x = S_y = 0.5$ and base point is A.	[03]
	(c)	A triangle ABC is represented as A (15, 15), B (65, 15) and C (40, 60). It is mirrored about a line y = 30. Determine the new coordinates of the triangle.	[04]

OR

Que. – 2		**Attempt all questions.**	
	(a)	A triangle ABC has vertices as A (2, 2), B (4, 3) and C (2, 3). It is desired to reflect through an arbitrary line y = 0.6 x +4. Calculate the new vertices of triangle.	[04]
	(b)	Determine the concatenated transformation matrix for rotating any entity about any given point.	[03]
	(c)	A square having end pints A (1, 1), B (6, 1), C (6, 6) and D (1, 6) is rotated by 50° in clockwise direction keeping B (6, 1) fixed, find its final coordinates.	[04]

Que. – 3		**Attempt all questions.**	
	(a)	Write down the advantage, disadvantage and applications of Reverse engineering.	[05]

(b) Write down the transformation matrix for orthographic and isometric projection. [04]

Section - II

Que. – 4   **Attempt all questions.**

(a) Explain the working principle of CRT with schematic diagram. [03]

(b) Write a program to draw line from point (5, 3) having length 20 units and angle of inclination 30^0 to horizontal by using Bresamham algorithm. [04]

(c) Write a C program to draw upper half circle by using Mid-point algorithm. [04]

OR

Que. – 4   **Attempt all questions.**

(a) Write a difference Ink-jet printer and Dot matrix printer. [03]

(b) Find out the pixel position on graphical display to draw circle which having center (1, 1) and radius 6 by using Bresamham's algorithm. [04]

(c) Determine the pixels for a straight line connecting two points (2, 7) and (15, 10) using DDA algorithm. [04]

Que. – 5   **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]

OR

Que. – 5   **Attempt all questions.**

(a) Differentiate curve fairing and curve fitting techniques. Curve approximation and analytical methods of curve generation. [04]

(b) Consider the polygon with vertices B1(1,1), B2(2,3), B3(4,3) and B4(3,1). Determine the fourth order periodic B-Spline curve for the open knot vector [0 0 0 0 1 1 1 1]. [06]

Que. – 6   **Attempt any Three questions** [09]

(a) Explain the following surfaces:
1. Patch 2. Ruled.

(b) Explain in brief the following features used in solid modeling of components:
1.Filleting 2. Chamfering 3. Shell 4. Lofting.

(c) Explain Graphics standard STEP.

(d) Explain the Bezier curves with neat sketch.

END OF PAPER