S.Y.B.SC. (COMPUTER SCIENCE) SEM –IV (2014 COURSE) :
WINTER - 2017
SUBJECT : COMPUTATIONAL GEOMETRY

Day : Saturday
Date : 28/10/2017

W-2017-0751

Time : 03.00 PM TO 05.00 PM
Max. Marks : 40

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.

Q.1 Attempt any **TWO** of the following: **(10)**

a) Show that the transformation matrix for rotation about the origin through an angle θ is $[T]=\begin{bmatrix}\cos\theta & \sin\theta \\ \sin\theta & \cos\theta\end{bmatrix}$.

b) Find the point of intersection of $A'B'$ and $E'F'$ lines AB and EF are transformed to the lines $A'B'$ and $E'F'$ respectively by using transformation matrix $[T]=\begin{bmatrix}1 & 2 \\ 1 & -3\end{bmatrix}$. If $A=[-1\ \ -1]$, $B=[3\ \ 5/3]$, $E=\begin{bmatrix}-\frac{1}{2} & \frac{3}{2}\end{bmatrix}$ and $F=[3\ -2]$.

c) Find the concatenated transformation matrix if an object is rotated about the point [4 3] through an angle 90^0.

Q.2 Attempt any **TWO** of the following: **(10)**

a) Determine the principal for shortening factor if the matrix for axonometric project is given by

$$[T]=\begin{bmatrix}0.99 & 0 & 0 & 0 \\ -0.09 & -0.66 & 0 & 0 \\ 0.08 & -0.74 & 0 & 0 \\ -2.5 & 3.05 & 0 & 1\end{bmatrix}$$

b) Develop transformation matrix to reflect through plane passing through $A[x_0\ \ y_0\ \ z_0]$ and parallel to yz– plane.

c) Find the concatenated transformation matrix for rotation about x-axis through an angle 60^0 followed by rotation about y-axis through an angle 90^0 and apply this on [x]where

$$[x]=\begin{bmatrix}0 & 0 & 1 & 1 \\ 2 & 0 & 1 & 1 \\ 2 & 3 & 1 & 1\end{bmatrix}$$

P.T.O.

Q.3 Attempt any **TWO** of the following: **(10)**

a) Obtain an algorithm to generate uniformly spared n points on the circle $x^2 + y^2 = r^2$.

b) Generate 10 points on the parabolic segment in the first quadrant for $1 \le x \le 4$ for the parabola given by $x = \theta^2 ; y = 2\theta$.

c) Find the parametric equation of a Be'zier curve determine by control points B_0[1 2], B_1[2 3], B_2[4 1] and hence find the position vector of the point corresponding to parameter value t = 0.1 and t = 0.2.

Q.4 Attempt any **FIVE** of the following: **(10)**

a) Write the transformation matrix for shearing in x-direction.
b) Explain over all scaling effect.
c) Define cabinet projection.
d) Write any two properties of B-spline curve.
e) Write recursion equation for ellipse.
f) Write parametric equation for Be'zier curve.
g) The ΔABC with position vector A [1 0], B [0 1] and C [-1 0] is transformed by $[T] = \begin{bmatrix} 3 & 2 \\ -1 & 2 \end{bmatrix}$. Find the area of $\Delta A'B'C'$.

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