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MMTE-004

00113

M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)
M.Sc. (MACS)

Term-End Examination

June, 2012

MMTE-004 : COMPUTER GRAPHICS

Time : 1½ hours *Maximum Marks : 25*

Note : *Question No. 1 is compulsory. Attempt any three questions out of 2 - 5. Use of calculator is not allowed.*

1. State whether the following statements are true or false. Justify your answer. **2x5=10**

(a) The focusing system in a CRT is needed to force the electron beam to converge into a small spot as it strikes the phosphor.

(b) Boundary fill algorithm is suitable for regions with boundary having more than one colour.

(c) Perspective projection is an affine transformation.

(d) A 2×2 matrix $T = \begin{bmatrix} \frac{1-t^2}{1+t^2} & \frac{2t}{1+t^2} \\ \frac{-2t}{1+t^2} & \frac{1-t^2}{1+t^2} \end{bmatrix}$

represents a rotation.

(e) The simultaneous shearing along both x-axis and $y-$axis is equal to the composition of shear along $x-$axis followed by shear along $y-$axis.

2. (a) Using the Bresenham circle algorithm do two iteration to find the pixel location approximating the first octant of a circle having a centre at (2, 3) and a radius of 2 units. 3

(b) Magnify the triangle P(0,0), Q(2, 2) and R(10, 4) to four times its size while keeping R(10, 4) fixed. 2

3. (a) Transform the scene in the world coordinate system with the view point at (3, 3, 3). The view plane normal vector is $(-1, -1, -1)$ and the view up vector is (0, 0, 1). 2

(b) Reflect the pyramid A(1, 0, 0), B(0, 1, 0), C(0, 0, 1) and D(0, 0, 0) about yz-plane. 3

4. (a) Use the midpoint method and symmetry considerations to scan convert the parabola $y=x^2$ over the interval $-1\leq x\leq 1$. Do upto 3 iterations. 3

(b) Explain the two character generation methods. Given a character set, which method will you prefer in case you are asked to generate characters with ten different sizes ? Justify your answer with appropriate reasons. 2

5. Find the equation of the Bezier curve which passes through (0, 0) and (−4, 2) and controlled through (14, 10) and (4, 0). 5