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MMTE-004

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

00851 **M.Sc. (MACS)**

Term-End Examination

June, 2019

MMTE-004 : COMPUTER GRAPHICS

Time : $1\frac{1}{2}$ hours *Maximum Marks : 25*

(Weightage : 50%)

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

1. State whether the following statements are *True* or *False*. Justify your answers. *5×2=10*

(a) In Bresenham's algorithm, while generating a circle, it is easy to generate one octant first and other by successive reflection.

(b) Rotation is a rigid body transformation that moves objects without deformation.

(c) Time spent in scanning across each row of pixels during screen refresh on a raster system with resolution of 1280×1024 and a refresh rate of 60 frames per second is 0·058 secs.

(d) CRT is a non-emissive display device.

(e) While drawing a circle, co-ordinates of only one-eighth of the total pixels lying on circumference of a circle are computed.

2. (a) Digitize a line from (10, 12) to (15, 15) on a raster screen using Bresenham's straight line algorithm. *3*

(b) What are the advantages of DVST over CRT ? Also list some disadvantages of DVST. *2*

3. A unit square is transformed by 2×2 transformation matrix. The resulting position vectors are

$$\begin{pmatrix} 0 & 2 & 8 & 6 \\ 0 & 3 & 4 & 1 \end{pmatrix}.$$

What is the transformation matrix ? *5*

4. (a) Using Cohen-Sutherland line clipping, compute the visible portion of the line segment A(0·6, 0·8), B(2·4, 1·7) for window (xmin, ymin) = (0, 0) and (xmax, ymax) = (2, 2). *3*

(b) Find the normalization transformation window to viewpoint, with window lower left corner at (1, 1) and upper right corner at (3, 5) onto a viewpoint with window, lower left corner at (0, 0) and upper right corner at $\left(\frac{1}{2}, \frac{1}{2}\right)$. *2*

5. (a) The reflection along the line y = x is equivalent to the reflection along the x-axis followed by counter clockwise rotation by θ degree. Find the value of θ. *3*

(b) Write the output obtained after the execution of the following OpenGL statements : *2*

```
glRotatef(90, 0, 0, 1)
glScalef(2, 2, 2)
glTranslatef(1, 0, 0)
```