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MMTE-004

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

M.Sc. (MACS)

00961

Term-End Examination

December, 2017

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.*

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

(a) Graphics and image processing technique used to produce a transformation of one object into another is called Animation.

(b) Frame buffer is the device which controls the refresh rate.

(c) Oblique projection with an angle of 30° to the horizontal plane is called cavalier projection.

(d) The matrix $\begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & -1 & 1 \end{pmatrix}$

represents 3D cartesian rotation.

(e) The output obtained from the following open GL commands

```
glColour3f (1., 1., 1.);
glColour3f (0., 1., 0.);
glVertex3f (1., 1., 1.);
```

is the Vertex (1, 1, 1) of Colour Blue.

2. (a) Consider a raster system with the resolution of 1024 × 768 pixels and the colour palette calls for 65,536 colours. What is the minimum amount of video RAM in megabytes that the computer must have to support the above mentioned resolution and number of colours ? *3*

(b) Distinguish between the following : *2*

(i) B-splines and Bezier curves

(ii) Uniform scaling and Differential scaling

3. (a) Prove that the mid-point of a straight line PQ[(0, 2), (3, 2)] after transformation $\begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$ will be the same as the mid-point of the transformed straight line P′Q′. *2*

(b) Consider a rectangle ABCD whose coordinates are A(1, 1), B(4, 1), C(4, 4) and D(1, 4) and the window coordinates are (2, 2), (5, 2), (5, 5) and (2, 5). If the given viewport location is (0·5, 0), (1, 0), (1, 0·5) and (0·5, 0·5), then obtain the viewing transformation matrix. *3*

4. (a) Magnify the triangle with vertices A(0, 0), B(1, 1) and C(5, 2) to twice it size while keeping C(5, 2) fixed. *2*

(b) Using Cohen-Sutherland line clipping algorithm, compute the visible portion of the line segment A(0·6, 0·8) and B(2·4, 1·7) for window $(x_{min}, y_{min}) = (0, 0)$ and $(x_{max}, y_{max}) = (2, 2)$. *3*

5. Using the mid-point circle generating algorithm, draw a circle whose radius is 10 units. *5*