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**MMTE–004**

**M. SC. (MATHEMATICS WITH  
APPLICATIONS IN COMPUTER  
SCIENCE) [M.SC.(MACS)]  
Term-End Examination  
June, 2024**

**MMTE-004 : COMPUTER GRAPHICS**

*Time :  $1\frac{1}{2}$  Hours*

*Maximum Marks : 25*

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**Note :** *Question No. 1 is compulsory. Attempt any  
three questions out of Question Nos. 2 to 5.  
Use of calculators are not allowed.*

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1. State whether the following statements are True or False. Justify your answer :  $5 \times 2 = 10$

(a) The parametric equation of line can be used in DDA algorithm for line generation.

(b)  $R_\theta = \begin{bmatrix} \cos^2 \theta & \sin \theta \\ -\sin \theta & \cos^2 \theta \end{bmatrix}$  is a 2-D rotational transformation matrix.

**P. T. O.**

- (c) In oblique projection, projectors are parallel to each other and are also perpendicular to the plane of projection.
- (d) Liang-Barsky is a bitwise line clipping algorithm.
- (e) Image aspect ratio is same as its resolution.
2. A geometric transformation is used in 2D to transform a triangle with vertices (0, 0), (1, 0), (1, 1) to another triangle (1, 1), (2, 1), (2, 2). Find out the transformation and write the same in the form :

$$x' = Ax + b$$

where  $x'$  = transformed point,  $x$  = original point,  $A$  is a  $2 \times 2$  matrix and  $b$  is a  $2 \times 1$  vectors.

3. Write the mid-point circle generation algorithm step by step and trace the algorithm to plot a circle with radius 10 and centre at (20, 20). 5
4. Trace Cohen-Sutherland line clipping algorithm for a line segment. (0, 0) to (10, 10), against a window with corners (5, 0); (10, 0); (10, 5) and (5, 5). 5
5. Find out the derivative curve (if any) of a Bezier curve with vertices (0, 0); (0, 1); (1, 1); (1, 0); that are the control points of line curve. Also, verify  $P(u = 0) = p_0$  and  $P(u = 1) = p_n$ . 5