

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

June, 2025

MMTE-004 : COMPUTER GRAPHICS

Time : 1½ Hours

Maximum Marks : 25

Weightage : 50%

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

1. State whether the following statements are True or False. Justify your answer : $5 \times 2 = 10$
 - (a) Multiplication of transformation matrices for two successive rotations is commutative.

- (b) The focusing system in a CRT is needed to force the electron beam to converge into a small spot as it strikes the phosphor.
 - (c) A perspective projection preserves relative proportions.
 - (d) The bitmap character generation method uses spline curves to generate character shape.
 - (e) Random scan display technique can be used to draw realistic pictures.
2. (a) What do you understand by the terms persistence, refresh rate and resolution ? Explain. 3
- (b) Differentiate between oblique and orthogonal projections. 2
3. (a) Show that, for all $\alpha, \beta \in \mathbf{R}$: 2
- $$S_x^{\text{shear}}(\alpha) S_x^{\text{shear}}(\beta) = S_x^{\text{shear}}(\alpha + \beta)$$
- (b) Find the uniform cube B-spline curve generated by the control points (1, 3), (4, 2), (-1, -1) and (2, 8). 3

4. (a) 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' is the transformed point, x is the original point, A is a 2×2 matrix and b is a 2×1 vector. 5

5. (a) Find the matrix of projection for the cavalier projection. 2
- (b) Write a C-code to draw a hexagon using OpenGL commands. 3

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