

2023

**COMPUTER SCIENCE — HONOURS****Paper : SEC-A-1 and SEC-A-2***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.***Paper : SEC-A-1****(Computer Graphics)****Full Marks : 80**Answer *question no. 1* and *any four* questions from the rest.1. Answer *any ten* questions :

2×10

- (a) Mention four applications of computer graphics.
- (b) Differentiate between vector and raster graphics.
- (c) Write down 3-D rotation matrix about x-axis and y-axis.
- (d) Define clipping and clip window.
- (e) What do you understand by scan conversion?
- (f) Write two techniques for producing colour displays with a CRT.
- (g) Why is homogeneous coordinates necessary?
- (h) Define aspect ratio.
- (i) Explain the following composite transformation :
  - (i) Translation (ii) Rotation.
- (j) Differentiate between interior and exterior clipping. ↵
- (k) Translation does not depend on reference point— Justify your answer.
- (l) Define resolution of a monitor.
- (m) Define world coordinate system.
- (n) What is meant by composite transformation?

- 2. (a) Mention the advantages and disadvantages of DDA algorithm.
- (b) Discuss the concept of 8-way symmetry while drawing a circle.
- (c) Derive and discuss mid point circle drawing algorithm with an example.

2+3+(5+5)

**Please Turn Over**

3. (a) A point A(4, 3) is rotated counter clockwise by an angle of  $45^\circ$ . Find the rotation matrix and the resultant point.
- (b) The coordinates of a triangle ABC are A(2, 2), B(4, 2), C(4, 4). Find the transformation matrix and the transformed coordinates after reflection about  $y = -x$ . (4+2)+(6+3)
4. (a) Distinguish between window port and view port.
- (b) Write Cohen-Sutherland line clipping algorithm.
- (c) Consider a clipping window ABCD where A(100, 10), B(160, 10), C(160, 40), D(100, 40). Use Cohen-Sutherland line clipping algorithm to find the visible portions of the line with end points (i)  $P_1(120, 5)$ ,  $P_2(180, 30)$ , (ii)  $P_3(120, 20)$ ,  $P_4(140, 80)$ . 3+4+(4+4)
5. (a) Find the transformation that converts a square with diagonal vertices (0, 4), (-4, 8) into a unit square at the origin.
- (b) 2D rotation with scaling is commutative— Justify your answer.
- (c) Write the transformation matrix for shear transformation with respect to X direction. 7+6+2
6. (a) Differentiate between parallel projection and perspective projection.
- (b) How is the intensity of the electron beam controlled inside a CRT?
- (c) Discuss different steps of the key-frame animation technique. 4+5+6
7. (a) Prove that two successive scaling transformations are commutative. (consider 2-D scaling)
- (b) How is the clipping operation performed for polygon using Sutherland-Hodgeman algorithm? Discuss with an example.
- (c) What are the advantages and disadvantages of LCD over CRT display system? 5+6+4
8. (a) What is computer art?
- (b) Discuss about morphing in computer graphics.
- (c) Discuss different types of morphing. Describe three applications of morphing. 3+4+(5+3)