

**2021**

**COMPUTER SCIENCE — HONOURS**

**Paper : SEC-A-1**

**(Computer Graphics)**

**Full Marks : 80**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

Answer **question no. 1** and **any four** from the rest.

1. Answer **any ten** questions : 2×10
- (a) How is spatial interpolation different from temporal interpolation?
  - (b) When can a series of transformation be termed as commutative?
  - (c) What are the three basic parts of a display system?
  - (d) What is a true colour system?
  - (e) What is the fundamental difference between the mode of operation of a monochrome CRT and a coloured CRT?
  - (f) How is colour depth and resolution of an image are related to video memory requirement?
  - (g) What feature of the liquid crystal material is used to produce image in LCD display system?
  - (h) What do you mean by refreshing a frame and what is the reason behind?
  - (i) Name the 3 major components present inside a CRT.
  - (j) What is perspective projection?
  - (k) Differentiate between interior clipping and exterior clipping.
  - (l) What is Affine transformation?
  - (m) Define resolution.
  - (n) What are keyframes in context to animation?
2. (a) Why is refreshing needed for a steady display? Explain.
- (b) Write a short note on Plasma Monitor display system.
- (c) Clip a line A (3, 20), B (13, 3) against rectangular window (5, 5) and (25, 15). Use Cohen Sutherland clipping algorithm to solve the problem. 5+5+5

**Please Turn Over**

3. (a) What do you mean by transformation in context to Computer Graphics? Why is translation known as 'rigid body transformation'?
- (b) Find the transformation that converts a square with diagonal vertices (0, 3) and (-3, 6) into a unit square at the origin.
- (c) What is the difference between parallel and perspective projection? 5+5+5
4. (a) Derive and discuss Bresenham's line drawing algorithm.
- (b) Implement the Bresenham's line drawing algorithm to draw a line from (4, 4) to (-3, 0).
- (c) What is a frame buffer? Differentiate between the feature of the frame buffer as used in Raster Scan and Random scan display system respectively. 5+5+5
5. (a) What are the basic principles behind reflection transformation?
- (b) Derive the transformation matrix for reflection considering the straight line  $Y = -X$  as the mirror line.
- (c) What is pure reflection?
- (d) What is shear? Write the transformation matrix for shear transformation with respect to X direction and Y direction shear. 3+5+2+5
6. (a) Consider an object ABC with co-ordinates A (1, 1), B (10, 1) and C (5, 5). Rotate the object by  $90^\circ$  in counter clockwise direction about the point A. Give coordinates of transformed object.
- (b) Write a short note on beam penetration method used in colour CRT monitors.
- (c) Write briefly about the two different types of retrace techniques used in Raster Scan display system. 5+5+5
7. (a) Write a short note on interlaced display system.
- (b) How is the intensity of the electron beam controlled inside a CRT?
- (c) Define scaling transformation. Differentiate between uniform scaling and differential scaling. 5+5+5
8. (a) Formulate the transformation matrix M which reflects an object about a line L whose Y intercept is (0, b) and an angle of inclination  $0^\circ$  with respect to X axis.
- (b) Consider a  $\Delta$  PQR with coordinate values P (10, 40), Q (40, 40), R (40, 30). What will be the transformed coordinate values if the 2D axis is rotated by  $45^\circ$  in anticlockwise direction and translated by 2 units in positive X direction and 1 unit in positive Y direction.
- (c) Differentiate between cavalier projection and cabinet projection. 5+5+5
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