3 (Sem–6/CBCS) CSC HC 2

2024

COMPUTER SCIENCE

(Honours Core)

Paper : CSC–HC–6026

(Computer Graphics)

Full Marks : 60

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

1. Answer the following questions as directed :
   1×7=7

   (a) A raster system uses a frame buffer to store the color value for each screen position. *(State true **or** false)*

   (b) In virtual-reality environments, data gloves are commonly used. *(State true **or** false)*

(c) The maximum number of points that can be displayed without overlap on a CRT is referred to as the _____.

(Fill in the blank)

(d) The number of pixel columns divided by the number of scan lines that can be displayed by the raster scan display system is known as _____.

(Fill in the blank)

(e) Bresenham's line algorithm uses only incremental integer calculations.

*(State true **or** false)*

(f) A three-element representation (xh, yh, h) of *two*-dimensional coordinate-position (x, y) is known as _____.

(Fill in the blank)

(g) _____ light for a scene is the illumination effect produced by the reflected light from the various surfaces in the scene.

(Fill in the blank)

2. Define the following terms : 2×4=8

   (a) Digitizer

   (b) Random scan display

   (c) Viewing transformation pipeline

   (d) Bezier curve

3. Answer *any three* of the following questions :
5×3=15

   (a) Briefly explain beam penetration method and shadow mask method.

   (b) Find composite transformation matrix to magnify a triangle placed at $A (0, 0)$, $B (1, 1)$ and $C (5, 2)$ to twice its size keeping the point C fixed.

   (c) Clip a line $A(-1, 5)$ and $B(3, 8)$ using Cohen-Sutherland line clipping with window coordinates $(-3, 1)$ and $(2, 6)$.

   (d) Given the specifications for the rotation axis and the rotation angle, write the steps to accomplish the required rotation in three-dimensional geometry.

   (e) Briefly explain Ray casting method.

4. Answer *any three* of the following questions :
10×3=30

   (a) Differentiate between—

   I. Raster scan display and Random scan display techniques;

   II. Emissive and Non-emissive flat panel.

Contd.

(b) Explain Bresenham's line algorithm. Also write the advantage of this algorithm over DDA algorithm.

(c) Explain scan line polygon fill algorithm.

(d) Explain Cohen-Sutherland line clipping.

(e) Show that the composition of *two* rotations is additive by concatenating the matrix representations for $R(\theta 1)$ and $R(\theta 2)$ to obtain

$R(\theta 1) . R(\theta 2) = R(\theta 1 + \theta 2)$

(f) Write short notes : *(any two)*

  (i) Hermite curve

  (ii) Parallel and perspective projection

  (iii) Specular reflector and Phong model

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