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.

(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
