Total No. of printed pages = 4

CSE 1815 PE 14

Roll No. of candidate | | | | | | | | | | |

2021

B.Tech. 5th Semester End-Term Examination

Program Elective — I

COMPUTER GRAPHICS

(New Regulation)

(w.e.f. 2017-18)

(New Syllabus)

(w.e.f. 2018-19)

Full Marks – 70 Time – Three hours

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

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

1. Answer the following : (MCQ/Fill in the blanks) (10 × 1 = 10)

(i) If (x, y) is a point inside the clipping window then it's code according to the Cohen-Sutherland algorithm is

(a) 0000 (b) 0001
(c) 1000 (d) 1100

(ii) In the polygon inside test, if the winding number of a point is zero then the point lies ———— the polygon.

(a) Inside (b) Outside
(c) On (d) As vertex of

(iii) Sutherland-Hodgeman algorithm is used for

(a) Line clipping (b) point clipping
(c) polygon clipping (d) Hybrid clipping

(iv) The property that Bezier curves do not have but B-splines have is

(a) Local control (b) Variation diminishing property
(c) Axis independence (d) Global control

[Turn over

(v) Control points are used to control the _____ of the curve.

(a) shape (b) edges

(c) values (d) iterations

(vi) The blending functions of Bezier curves are

(a) Splines (b) Berstien polynomials

(c) Lagramgian polynomials (d) Newton polynomials

(vii) An orthographic projection in which the direction of the projection is not parallel to any of the three principal axes is called

(a) Cavalier projection (b) Perspective projection

(c) Oblique projection (d) Axonometric projection

(viii) Axonometric projection is

(a) an orthographic projection

(b) a perspective projection

(c) an oblique projection

(d) a multiview projection

(ix) A 512 × 512 raster requires _____ its in a bit plane.

(a) 2^{12} (b) 2^{18}

(c) 2^{10} (d) 2^{8}

(x) In Bresenham's circle generation algorithm, if (x, y) is the current pixel position then the y-value of the next pixel position is

(a) y or $y+1$ (b) y alone

(c) $y+1$ or $y-1$ (d) y or $y-1$

2. (a) Consider a line whose end points are (2,3) and (6,18). Using Bresenham's algorithm draw the line. (6)

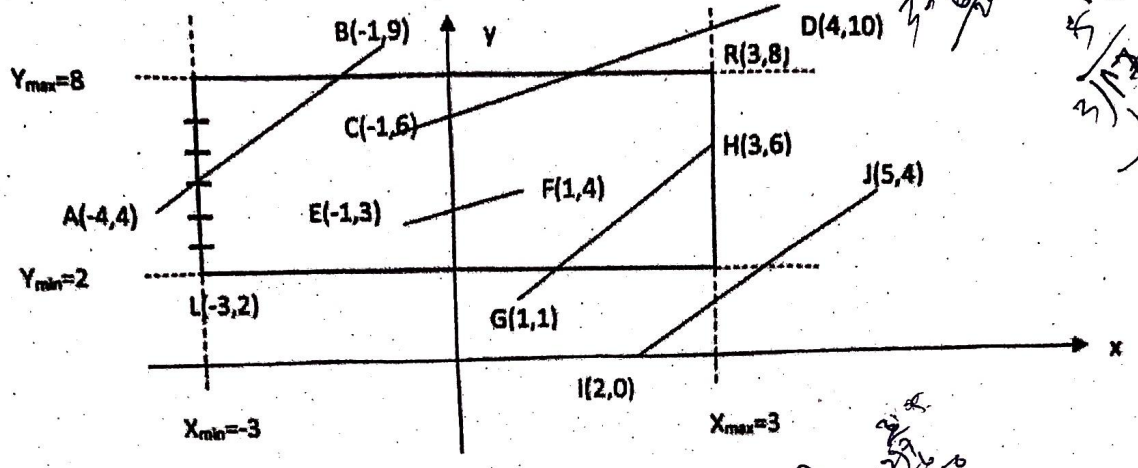
(b) Find the 2-dimensional transformation matrix that represents rotation of an object by 30° about the origin. What are the new coordinates of the point P(2,-4) after rotation? Explain Boundary fill algorithm. (6+3=9)

3. (a) Differentiate between Random scan and Raster scan devices. (5)

(b) Explain the mid point circle drawing algorithm.

Prove that two scaling transformations are commutative. i.e. $S_1 S_2 = S_2 S_1$. (5+5=10)

4. (a) Let R be the rectangular window whose left lower hand corner is at L(-3,2) and upper right hand corner is at R(3,8). Use Cohen-Sutherland algorithm to clip the line segments. (7)



(b) Explain 2D viewing pipeline ?

Show that transformation matrix for a reflection about $y = -x$ is equivalent to reflection relative to the y axis followed by a counter clockwise rotation by 90°. (4+4=8)

5. (a) Define Bezier curve. Explain properties of Bezier curve?

Construct enough points on the Bezier curve whose control points are $P_0(4,2), P_1(6,3), P_2(8,4)$ and $P_3(10,6)$ to draw an accurate sketch. (5+5=10)

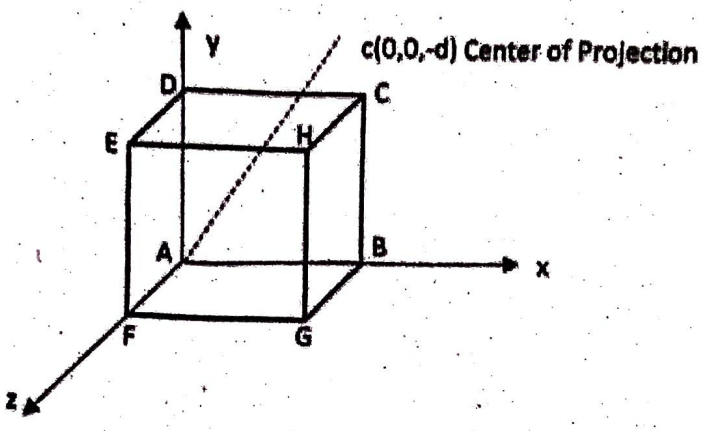
(b) Describe Gouraud shading. (5)

6. (a) Explain depth buffer algorithm. Design animation sequences. (5+5=10)

(b) Define CMY color model. (5)

7. (a) Consider rectangular parallelopiped which is 2 distance on z-axis and 4 distance on x axis and 2 distance on y-axis. What is the effect of scaling when scaling factor $S_x = 1/4$, $S_y = 1/6$ and $S_z = 1/2$? (6)

(b) The unit cube is projected onto xy plane. Draw the projected image using the standard perspective transformation with d=1, where d is distance from the view plane.



What is projection and describe different types of projection. (5+4=9)