

2018

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 856

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Your Roll No.....

Unique Paper Code : 234601

Name of the Course : B.Sc. (H) Computer Science

Name of the Paper : Computer Graphics (CSHT-614)

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. The question paper consists of two sections.
3. Section A is compulsory.
4. Attempt any four questions from Section B.

SECTION A

1. (a) Consider two different raster systems with resolutions 640×480 and 1280×1024 . What size frame buffer (in bytes) is needed for each of these systems to store 12 bits per pixel ? 1+1 (2)

- (b) What is anti-aliasing ? Discuss any one anti-aliasing method. (3)

2. (a) What is the condition that ellipse scan conversion algorithm uses to divide the first quadrant of the ellipse in two regions ? $b^2x^2 + a^2y^2 - a^2b^2 = 0$; $2b$ - minor axis
 $2a$ - major axis
 $a^2(y_p - 1/2) \leq b^2(x_p + 1)$ (3)

- (b) What are the disadvantages of DDA line drawing algorithm ? (2)

3. (a) Write the 3D projection matrices for each of the following :

- (i) Orthographic projection on $x=0$ plane

1 marks

P.T.O.

- (ii) Single point perspective projection with centre of projection on y-axis at $y_c = 2$.

(iii) Trimetric Projection matrix. $R_y R_x P_z$ (1+2+2)

4. Derive the basis matrix for Bezier curve. *step wise marking* (5)
5. Discuss Depth sorting method for hidden surface elimination. What tests are performed when there is depth overlap? *Also 2 + 3 Test* (5)
6. (a) Write steps to design an animation sequence. (2)
- (b) What is Dithering? What is its advantage over halftoning? *Adv 2+1* (3)
7. Derive the illumination using Phong specular-reflection model. Include the contribution of diffuse, ambient and specular reflection. *1+2+2* (5)

SECTION B

8. (a) Explain Shadow mask and beam penetration methods used in raster scan systems to display colors. (4)
- (b) Indicate which raster locations would be chosen by Bresenham's algorithm when scan-converting a line from screen coordinate (1,1) to screen coordinate (8,5). (6)
9. (a) Differentiate between Phong and Gouraud shading models. *2+2* (4)
- (b) Consider a polygon ABCDE, A(2,3), B(7,3), C(7,17), D(4,7), E(2,10). Use Scan line fill algorithm to fill the polygon till scan line 8. Show the global edge table and active edge table at each step. (6)

2 (GET) - AET = 4

10. (a) Show that a 2D reflection through the x-axis, followed by a 2D reflection through the line $y=x$, is equivalent to a pure rotation about the origin. (4)
90 or det [0 1]

(b) A clipping window has two vertices lying at (0,0) and (80,40). Use the line end point codes to determine whether the lines P(40,20), Q(70,50) and R(100,20), S(120,60) would be visible, partially visible or totally invisible. (4)
2+2

(c) What is RGB color model? How RGB model represented? (2)
1+1 primary colour

11. (a) Give the 3D homogeneous matrix for each of the transformations in parts i-iii. :

(i) Scale in the x-dimension by 2 and the y-dimension by 3 with fixed point (4,2,2)

(ii) Rotate by 30 degrees about the x-axis.

(iii) Reflect about the Y-axis. (3+2+2)

(b) Consider a line AB parallel to Z-axis with end-points A[3 2 4 1] and B[3 2 8 1]. Perform perspective projection onto $z=0$ plane with the centre of projection at $Z_c = 2.0$. (3)
2+1

12. (a) Find the equation of the Bezier curve that passes through (0, 0) and (4, 2) and controlled through (14,10) and (4, 0). (5)
equation (3 marks) + 2 on value

(b) Write the pseudo code for Z-buffer Visible surface determination algorithm? What are its advantages and disadvantages? (5)
3+2 schedule code or algo

13. (a) What are trace points? How are they different from principal vanishing points? (2)
1+1

(b) How do we simulate acceleration in any animation? Describe how the frame spacing controls the motion simulated in an animation scene? (4)

(c) A triangle is defined by vertices $(2,0), (0,2), (-2,0)$. It is transformed by the 2×2 transformation matrix:

$$T = \begin{bmatrix} 6 & 4 \\ 2 & 4 \end{bmatrix}$$

Find the area of transformed triangle.

2 marks
if Area.

(4)

formula then (2) marks

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