

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 110514

Roll No *uptuonline.com*

B.Tech.

(SEM. V) THEORY EXAMINATION, 2015-16

COMPUTER GRAPHICS

[Time : 3 hours]

[Maximum Marks : 100]

Note : Attempt questions from all Sections as per directions.

Section-A

1. Attempt *all parts* of this section. Answer in brief.  
(2×10=20)
  - (a) Give window to viewport transformation matrix.
  - (b) We require large refresh rate mainly due to short persistence of phosphor. Why not use a long persistence of phosphor instead to reduce the frame rate? *uptuonline.com*
  - (c) What is resolution?
  - (d) Define computer graphics.
  - (e) Define polygon.

- (f) What is transformation?
- (g) What is translation?
- (h) Define clipping.
- (i) Define B-Spline curve
- (j) What is a spline? *uptuonline.com*

Section-B

Attempt *any five* questions from this section.

(10×5=50)

2. Rotate a triangle at A (0, 0), B (1, 1), C (5, 2) by 45° about:
  - (i) Origin (0, 0)
  - (ii) Point P (-1, -1). Find new coordinates of the rotated figure.
3. Write Liange Barsky algorithm for line clipping. Use Liange Barsky line clipping algorithm to clip the line P1 (-15, -30); to P2 (30, 60) against the Window having diagonally opposite corners as (0, 0) and (15, 15).
4. What is the importance of hidden line and surface removal algorithm? Discuss the mechanism of Z-buffer surface removal algorithm and differentiate it with A-buffer surface removal algorithm.

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5. Show that the uniform scaling and rotation make commutative pairs but in general scaling and rotation are not commutative. *uptuonline.com*
6. Implement a back-face detection procedure using an orthographic parallel projection to view visible faces of a convex polyhedron. Assume that all parts of the object are in front of the view plane and provide a mapping onto a screen viewport for display.
7. Show that the composition of two rotations is additive by concatenating the matrix representations for  $R(\theta_1)$  and  $R(\theta_2)$  to obtain  $R(\theta_1) * R(\theta_2) =: R(\theta_1 + \theta_2)$
8. Explain with example - Warnock algorithm for hidden surface removal. Also draw the window tree structure for the same example.
9. Design a parallel version of Bresenham's algorithm for straight lines of any slope.

### Section-C

Attempt *any two* questions form this section.

(15×2=30)

10. (a) Write and explain with example weiler and Atherton polygon clipping algorithm.
- (b) Explain the working of colour CRT by using delta shadow mask method.

11. Write short notes on any two of the following:

- (a) 3-D transformation  
(b) 3-D projection  
(c) 3-D clipping

12. (a) Write an algorithm to draw Bezier curves.

- (b) What are the various back face detection algorithms? Explain any one of them.

—x—

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