

[This question paper contains 4 printed pages.]

6630

Your Roll No.....

B.Sc. (H) Computer Sci. / VI Sem. B

Paper – 603 : Computer Graphics

(Admissions of 2001 and onwards)

Time : 3 Hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt both the Sections A, B.

Section A is compulsory.

Attempt any four questions from Section B.

Questions of a section should be answered together.

SECTION A

1. (a) Give the differences between random scan and raster scan display devices. (3)
(b) Define the terms Resolution and Aspect Ratio. (2)
2. Derive the decision parameter for mid point circle drawing algorithm. The centre of the circle is at (0, 0) and radius is 'r'. (5)
3. (a) What do you mean by aliasing? List any two techniques to remove this effect. (3)

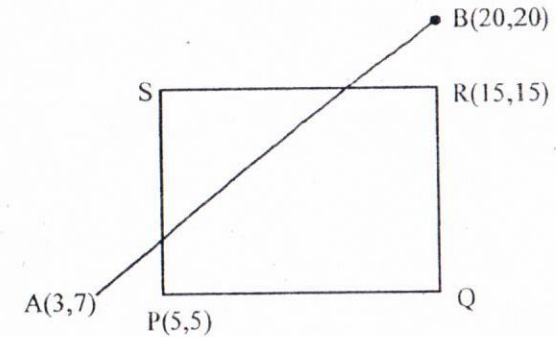
P.T.O.

- (b) List the two methods to specify motion between two key frames. (2)
4. (a) Show that there is a one to one correspondence between points. (3)
- (b) For projection on the plane $X = 0$. (2)
5. (a) What is the advantage of using homogenous coordinates? (2)
- (b) List the various ambiguities that may arise in Depth sort algorithm of Hidden surface removal when polygon's Z-extent overlaps. (3)
6. (a) What is polygon mesh? Illustrate any two polygon mesh representations. (3)
- (b) Give two properties of Bezier curves. (2)
7. Explain Phong shading. How is it better than Gruraud shading? (5)

SECTION B

8. (a) Show the working of midpoint ellipse drawing algorithm (only first quadrant, region 1) to draw an ellipse centred at origin with length of major axis as 8 and minor axis as 6. (7)
- (b) Discuss the shadow mask technique for implementing a color raster scan CRT. (3)

9. (a) Consider the following figure :



Clip the line AB against the clip rectangle PQRS using Cohen-Sutherland line clipping algorithm. (6)

- (b) Discuss the two data structures used in Scan line Polygon filling algorithm. (4)
10. (a) Obtain the 3D composite Transformation matrix to successively rotate an object (anticlockwise) about Y-axis by an angle of 90° , reflect through YZ plane and uniformly double the size of an object. (Use homogenous coordinates). (5)
- (b) Consider a Cube with the following position vectors :

$$X = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

Rotate it about Y-axis by $\phi = 30^\circ$, Translate it by -2 units in Y. Apply single point perspective projection on $Z = 0$ plane from centre of projection at $Z = Z_c = 3.0$ units. (5)

11. (a) What do you understand by vanishing points ? (2)
- (b) Given a Bezier Curve $Q(t)$ defined by points P_1, P_2, P_3, P_4 . Divide this curve segment into two parts in the ratio 1:1 and find control points for the left and right Bezier curve. (4)
- (c) Derive the parametric equation of a Hermite curve with usual boundary conditions. (4)
12. (a) Explain the Phong-Specular-reflection model. (6)
- (b) What do you understand by Halftoning? Draw the 3×3 halftone grid patterns to display 10 intensities on a bilevel system. (4)
13. (a) Explain in detail an area subdivision algorithm for hidden surface removal. (5)
- (b) Explain briefly how can we simulate zero acceleration, positive acceleration and deceleration between two key frames is an animation. (5)