

Con. 5323-09.

(REVISED COURSE)

SP-8652

(3 Hours)

[Total Marks : 100

- N.B.: (1) Question No. 1 is compulsory.
 (2) Solve any **four** questions from the remaining **six** questions.
 (3) **Figures** to the **right** indicate **full** marks.
 (4) Make **suitable** assumptions wherever **necessary** and state them clearly.

1. (a) Derive the Bresenham's line drawing algorithm. What are its advantages ? 10
 (b) Differentiate between Raster scan display and Random scan display. 5
 (c) Write a short note on Homogeneous co-ordinate system. 5
2. (a) Explain Flood Fill Algorithm using 8-connected approach. What are its advantages over Boundary Fill Algorithm ? 7
 (b) What are 3D trackers ? Enumerate some important tracker characteristics. 5
 (c) Show that transformation matrix for a reflection about a line $y = x$ is equivalent to reflection to x-axis followed by counter clockwise rotation of 90 degree. 8
3. (a) Write detailed note on 3D Rotation about an axis that is not parallel to one of the co-ordinate axes. 10
 (b) What kind of Bounding Boxes exists ? What are they used for ? Explain undetected collision and state ways to alleviate the problem of undetected collision. 10
4. (a) Explain in detail any VR toolkit. 10
 (b) List various types of computing architectures of VR and explain any one in detail. 10
5. (a) What are different types of projections ? Derive the matrix representation for Perspective transformation in XY-plane and on negative Z-axis. 10
 (b) Explain LeGrange Interpolation curve in detail. 10
6. (a) Let R be the rectangular window whose lower left hand corner is at L(-3,1) and upper right corner is at R(2,6). Find the region codes for the endpoints and use Cohen-Sutherland algorithm to clip the line segments. 10
 Coordinates for line segments are :—
 For Line AB A (-4, 2) and B (-1, 7)
 CD C (-1, 5) and D (3, 8)
 EF E (-2, 3) and F (1, 2).
 (b) Derive the mathematical representation for Bezier curve and state their properties. 10
7. (a) Write a short notes on any **two** of the following :— 10
 (i) Compare mesh and feature based warping method
 (ii) What are the advantages of 3D morphing over 2D morphing ?
 (iii) TPS based image warping.
 (b) Explain any VR application with suitable example. 10