

END TERM EXAMINATION

FIFTH SEMESTER [BCA] JANUARY 2024

Paper Code: BCA-303

Subject: Computer graphics

(Batch 2021 onwards)

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

- Q1 Answer the following (Any Five): (5x5=25)
- What is a video controller? Explain the working of a video controller.
 - Explain the terms- Vertical Retrace, Persistence, Frame Buffer. How much storage (in bytes) is required for a system if 24 bits per pixel are to be stored?
 - What is the purpose of using homogeneous coordinate in Computer Graphics? Write matrix representations for 3D transformations of-Rotation and Scaling using homogeneous coordinates.
 - Point out the characteristics of a Bezier curve. Explain Convex hull property in detail.
 - Explain Phong model.
 - Write notes on - i) B-Spline curves ii) Hermite curves
 - Define-world coordinate, viewing coordinate, normalized coordinate, and device coordinate in a viewing pipeline.
 - Discuss Z buffer method of hidden surface removal technique.

Unit-I

- Q2 a) Describe Digital Differential Analyzer (DDA) algorithm for line drawing. Find out all the valid activated pixels from (0,0) to (10,5) using DDA. (7)
- b) Elucidate the advantages of interactive Graphics. Explain the differences between raster and random scan display devices. (5.5)
- Q3 a) What is rasterization? Explain the steps to scan convert a circle using midpoint algorithm. (6.5)
- b) What are the disadvantages of DDA line drawing algorithm? Compare DDA with Bresenham's line drawing algorithm. (6)

Unit-II

- Q4 a) Let W be a rectangular window whose coordinates are L(-3,1) and R(14,6). Find the visible portion of the line segment joining the points (-10,5) to (10,5) using Cohen-Sutherland line clipping algorithm. (6)
- b) Deduce Window-to-Viewport transformation with proper diagram. (6.5)
- Q5 a) What is composite transformation? Magnify the triangle with vertices P(0,0), Q(1,1) and R(5,2) to twice its size keeping R(5,2) fixed. (6.5)
- b) What are shearing and reflection in 2D transformation? Write the matrix representations of -

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- i) Xshear ii) Yshear iii) X-Y shear using homogeneous coordinates. (6)

Unit-III

- Q6 a) Given a Bezier curve with 4 control points- $P_0(1,0)$, $P_1(3,3)$, $P_2(6,3)$, $P_3(8,1)$. Find any 5 points lying on the curve and draw a rough sketch of the curve. (12.5)
- Q7 a) Explain different types of parametric continuities of a curve? (6)
- b) Define surface rendering in Computer Graphics. Distinguish between Gourard shading and Phong shading. (6.5)

Unit-IV

- Q8 a) Explain Painter's algorithm for hidden surface removal with proper sketch. Discuss how it is different from depth buffer method. (6.5)
- b) Write notes on - (2x3=6)
- B-representation
 - Spatial partitioning representation
- Q9 Discuss various types of projections in 3D graphics with suitable diagrams. (12.5)

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