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)**

a) What is a video controller? Explain the working of a video controller.

b) 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?

c) What is the purpose of using homogeneous coordinate in Computer Graphics? Write matrix representations for 3D transformations of-Rotation and Scaling using homogeneous coordinates.

d) Point out the characteristics of a Bezier curve. Explain Convex hull property in detail.

e) Explain Phong model.

f) Write notes on – i) B-Spline curves ii) Hermite curves

g) Define-world coordinate, viewing coordinate, normalized coordinate, and device coordinate in a viewing pipeline.

h) 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 –

P.T.O.

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. **(6.5)**

Discuss how it is different from depth buffer method. **(2x3=6)**

b) Write notes on –
i) B-representation
ii) Spatial partitioning representation

Q9   Discuss various types of projections in 3D graphics with suitable diagrams. **(12.5)**

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