END TERM EXAMINATION

FIFTH SEMESTER [BCA] NOVEMBER-DECEMBER 2017

Paper Code: BCA-303	Subject: Computer Graphics
Time: 3 Hours	Maximum Marks: 75

**Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each unit.**

Q1   Answer **any ten** questions of the following: **(2.5x10=25)**
(a) Draw the architecture of a simple raster graphics system?
(b) Give three differences between parallel and perspective projections.
(c) Define the terms persistence and aspect ratio.
(d) List three properties of B spline curve?
(e) How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280x1024 and a refresh rate of 60 frames per second?
(f) What is significance of homogeneous coordinate system in graphics?
(g) List advantages and disadvantages of DDA algorithm for line drawing.
(h) Consider a raster system with resolution of 1280x1024. How many pixels could be accessed per second in the system by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel?
(i) What is Anti-Aliasing?
(j) Give the transformation matrices for 3D rotation.
(k) List three properties of a B-Spline curve.

Unit-I

Q2   (a) Derive condition for scan converting a circle using Bresenham's circle drawing algorithm. Draw an octant of a circle of radius 8 and centered at origin giving all steps.   **(7.5)**
(b) List and explain the applications of interactive computer graphics. **(5)**

Q3   (a) Given a clipping window A(20, 20) B(60, 20) C(60, 40) D(20, 40). Using Cohen Sutherland algorithm find the visible portion of line segment joining the point P(40, 80) Q(120, 30)?   **(6.5)**
(b) Discuss about midpoint subdivision algorithm.   **(6)**

Unit-II

Q4   (a) Consider the square (0,0), (2,0), (2,0), (2,2). Perform a composite transformation of the square by using the following steps. (Give the coordinates of the square at each of the intermediate steps).
(i) Scale by using $S_x = 2$ and $S_y = 3$.
(ii) Rotate 45^0 in the anticlockwise direction.
(iii) Translate by using $T_X = 3$ and $T_y = 5$.   **(6.5)**
(b) Derive the transformation matrix for reflection of a point about an arbitrary line y = mx+c.   **(6)**

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Q5 (a) A polygon is describe by A(40, 70), B (60, 40), C(40, 10), D(20, 40) & A (40, 70). It is desired to scale up the polygon to double of the size but located at the same position. Indicate the necessary transformation to carry out the task and find the transformed coordinates of the polygon. **(6.5)**

(b) Suppose there is a rectangle ABCD whose co-ordinates are A(1,1), B(4,1), C(4,4), D(1,4) and the window co-ordinates are (2,2), (5,2), (5,5), (2,5) and the given viewport location is (0.5, 0) (1, 0.5), (0.5, 0.5). Calculate the viewing transformation matrix? **(6)**

Unit-III

Q6 (a) Construct enough points on the Bezier curve whose control points are $P_0(4,2)$, $P_1(8,8)$ and $P_2(16,4)$ to draw an accurate sketch. What is the degree of the curve? What are the coordinates at v = 0.5? **(7.5)**

(b) Explain Boundary representations with examples. **(5)**

Q7 (a) Write in detail on CSG methods and how CSG operations are implemented using ray casting methods. **(6.5)**

(b) List all the properties of the Bezier curve. Prove one property of the curve. **(6)**

Unit-IV

Q8 (a) Define principal vanishing point. Discuss types of perspective projections. **(6.5)**

(b) Explain the Depth sorting Algorithm for Hidden Surface Removal. **(6)**

Q9 (a) Find the transformation for Cavalier projection with $\theta = 45^0$. Find the projection of a unit cube using the Cavalier transformation. **(7.5)**

(b) Describe the three dimensional Cohen-Sutherland clipping algorithm. **(5)**

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