

END TERM EXAMINATION

FIFTH SEMESTER [BCA] DECEMBER 2015

Paper Code: BCA303

Subject: Computer Graphics
(Batch 2011 onwards)

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 Explain any five of the following:- (5x5=25)
- (a) Role of Video Controller in Raster Display systems
 - (b) Conceptual framework for Interactive Graphics
 - (c) Matrix representation of 3D Scaling
 - (d) Transformation as a change in Coordinate System
 - (e) Polygon Mesh
 - (f) Octree

UNIT-I

- Q2 (a) What do you mean by scan conversion? Derive the equations for scan converting a line using Bresenham's line drawing algorithm. (7.5)
- (b) Differentiate between Random scan and Raster scan. Explain random scan display processor with suitable diagram. (5)
- Q3 (a) What is clipping? Explain Cohen - Sutherland line clipping algorithm. (7.5)
- (b) Let R be the rectangular window whose lower left hand corner is at $L(-3, 1)$ and upper right hand corner is at $(2, 6)$. Find the endpoint codes for the following points according to Cohen Sutherland algorithm of line clipping.
- A(-4,2), B(-1,7)
C(-1,5), D(3,8)
E(-2,3), F(1,2)
G(1,-2), H(3,3)
I(-4,7), J(-2,10) (5)

UNIT-II

- Q4 (a) Find the general form of the transformation N which maps a rectangular window with x extent $w_{x_{min}}$ to $w_{x_{max}}$ in x direction and y extent $w_{y_{min}}$ to $w_{y_{max}}$ in y direction on to a rectangular viewport with x extent $v_{x_{min}}$ to $v_{x_{max}}$ and y extent $v_{y_{min}}$ to $v_{y_{max}}$. (7.5)
- (b) Explain the transformation matrixes for various 2 D transformation in homogenous coordinates. (5)
- Q5 (a) Find the complete viewing transformation that maps a widow in a world coordinates with x extent 1 to 10 and y extent 1 to 10 on to a viewport with x - extent $\frac{1}{4}$ to $\frac{3}{4}$ and y extent 0 to $\frac{1}{2}$ in normalized device space, and then maps a window with x extent $\frac{1}{4}$ to $\frac{3}{4}$ and y extent $\frac{1}{4}$ to $\frac{3}{4}$ in the normalized device space in to a viewport with x extent 1 to 10 and y extent 1 to 10 on the physical display device. (7.5)
- (b) Find the normalization transformation N which uses the rectangle A(1,1), B(5,3), C(4,5), D(0,3) as a window and the normalized device screen as a viewport. (5)

UNIT-III

- Q6 (a) Define parametric Bicubic surface? Discuss Hermite surface in detail. (7.5)
- (b) State and prove a property of a Bezier Curve with four control points. (5)
- Q7 (a) Explain how Bezier curves are represented parametrically. Consider a Bezier Curve having control points $P_1(20,0)$, $P_2(0,20)$, $P_3(80,40)$, $P_4(40,0)$. Compute the coordinates of the points on the curve for $t = 0.0, 0.2, 0.6, 1.0$. (7.5)
- (b) What is CSG? Discuss various user interfaces for solid modeling. (5)

UNIT-IV

- Q8 (a) What do you mean by Hidden Surface? Discuss z - buffer method for removal of hidden surface. (7.5)
- (b) Define Projection? Differentiate between parallel and perspective projection with suitable examples. (5)
- Q9 (a) "Hidden surface should be removed" why? Discuss painter's algorithm for hidden surface removal. (7.5)
- (b) Define Orthographic Projection. Discuss different applications of parallel and perspective projections. (5)