

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 (1,3, 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 window 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)