



CS 412

COMPUTER GRAPHICS
(Elective I)

UNIT-I

Graphics Systems and Models: Graphics system; Images; Physical and synthetic; Imaging system; synthetic camera model; programming interface ; graphics architectures programmable pipelines; performance characteristics. Graphics Programming: Programming two-dimensional applications; OpenGL API; Primitives and attributes; color; viewing, control functions

UNIT-II

Input and Interaction: Input device; clients and servers; displays lists; display lists and modeling; programming event driven input; picking ; building interactive models; animating Interactive programs; logic operations. Geometrics Objects: Three - dimensional primitives; coordinates systems and frames; frames in OpenGL; Modeling colored cube.

UNIT-III

Transformations: Affine Transformations; Transformations in homogenous coordinates; concatenation of Transformations; OpenGL transformation matrices; Viewing: Classical and Computer views; Viewing with a computer; Positioning of camera; Simple projections; Projections in OpenGL; Hidden surface removal; Parallel-projection matrices; Perspective projection matrices

UNIT-IV

Lighting and Shading: Light sources; The Phong lighting model; Computational vectors; Polygonal shading; Light sources in OpenGL; Specification of matrices in OpenGL; Global illumination; From Vertices To Frames: Basic implementation strategies; line-segment clipping; polygon clipping; clipping of other primitives; clipping in three dimensions; Rasterization ; Bresenham's algorithm; Polygon Rasterization ; Hidden surface removal; anti-aliasing; display considerations.

UNIT-V

Modelling & Hierarchy: Hierarchical models; trees and traversal; use of tree data structure; animation; Graphical objects; Scene graphs; Simple scene graph API; Open Scene graph; other tree structures; Curves and Surfaces: Representation of curves and surfaces; design criteria; Bezier curves and surfaces; Cubic B-splines; General B-splines; rendering curves and surfaces; curves and surfaces in OpenGL.

Suggested Readings:

1. Edward Angel ,Computer Graphics A Top-Down Approach Using OpenGL, Pearson Education, 5th edition -2009.
2. **Fransis S Hill Jr., Stephen M Kelley, Computer Graphics Using OpenGL, Prentice-Hall Inc., 3rd edition , 2007.**
3. Jim X. Chen, Foundation of 3D Graphics Programming Using JOGL and Java3D, Springe Verlag, 2006.
4. Hearn Donald, Pauline Baker M: Computer Graphics, 2nd edition , 1995

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