

**III/IV B. TECH. SECOND SEMESTER
COMPUTER GRAPHICS
(Required)**

Course Code: CS6T3**Credits: 3****Lecture: 3 periods/ week****Internal assessment: 30 Marks****Tutorial: 1period/week****Semester end examination: 70 Marks**

Prerequisites: Program Design

Course Objectives:

1. Provide foundation in graphics applications programming
2. Introduce fundamental concepts and theory of computer graphics
3. Give basics of application programming interface (API) implementation based on graphics pipeline approach

Course Outcomes:

At the end of this course student will:

CO1) Understand graphics applications, architectures and openGL program structure.

CO2) Apply basic transformations on objects

CO3) Apply line and polygon clipping algorithms

CO4) Illustrate different projections

CO5) Design interactive programs using openGL

Syllabus:**UNIT 1****Introduction:** Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; the synthetic camera model; the programmer's interface; Graphics architectures. Graphics Programming: The

Sierpinski gasket; Programming two- dimensional applications. The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program.

UNIT 2**Input and Interaction:** Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling; Programming event-driven input; Menus; Picking; Animating interactive programs; Logic operations.

UNIT 3

Geometric Objects and Transformations: Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Modeling a colored cube; Affine transformations; Rotation, translation and scaling. Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices.

UNIT 4

Viewing: Classical and computer viewing; Viewing with a computer; Positioning of the camera; Simple projections; Projections in OpenGL; Parallel-projection matrices; Perspective-projection matrices.

UNIT 5

Implementation: Basic implementation strategies; Clipping; Cohen-Sutherland Line-segment clipping; Polygon clipping; Clipping of other primitives; Clipping in three dimensions; Rasterization; Bresenham's algorithm; Polygon rasterization;

Learning Resource**Text Books**

1. Interactive Computer Graphics A Top-Down Approach with OpenGL, Edward Angel, 5th Edition, Pearson, 2009.
2. Computer Graphics through OpenGL: From Theory to Experiments, Sumantha Guha, Chapman and Hall/CRC, 2011 (For OpenGL and related examples).

References

1. Computer Graphics with OpenGL, Hearn & Baker, 3rd Edition, Pearson 2004.
2. Computer Graphics Using OpenGL, F.S. Hill, Jr, and M. Kelley, Jr., 3rd Edition, Pearson/PHI, 2009.