Section 1 Introduction to Computer Graphics

Overview of Computer Graphics, Computer Graphics Application and Software, Description

of some graphics devices, Input Devices for Operator Interaction, Active and Passive

Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic

Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray

Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, RandomScan Display Processor, LCD displays.

Section 2 Two-Dimensional Transformations

Transformations and Matrices, Transformation Conventions, 2D Transformations,

Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations

and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation,

Transformation of Points, Transformation of The Unit Square, Solid Body Transformations,

Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric

Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.

Section 3 Three-Dimensional Transformations

Introduction, Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional

Rotation, Three-Dimensional Reflection, Three-Dimensional Translation, Multiple

Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary

Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations,

Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating

Perspective Views, Vanishing Points, the Perspective Geometry and camera models,

Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for

projections.

Section 4 Viewing in 3D

Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View,

Examples of 3D Viewing, The Mathematics of Planar Geometric Projections, Combined

transformation matrices for projections and viewing, Coordinate Systems and matrices,

camera model and viewing pyramid.

Section 5 Scan conversion – lines, circles and Ellipses; Filling polygons and

clipping algorithms

Scan Converting Lines, Mid-point criteria, Problems of Aliasing, end-point ordering and

clipping lines, Scan Converting Circles, Scan Converting Ellipses, Filling Polygons, edge

data structure, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and LiangBarsky, Clipping Polygons, problem with multiple components.

Section 6 Graphics Programming using OPENGL

Why OpenGL, Features in OpenGL, OpenGL operations, Abstractions in OpenGL – GL, GLU

& GLUT, 3D viewing pipeline, viewing matrix specifications, a few examples and demos of

OpenGL programs.

Section 7 Image Manipulation and Storage