

MCC 402 COMPUTER GRAPHICS AND MULTIMEDIA

Module – 1 (14 hours)

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, Introduction to OpenGL.

Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations, Other Transformations (Reflection, shear), Transformation between coordinate systems, Affine Transformations.

Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective), Clipping Algorithms.

Module – 2 (14 hours)

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Shape Grammars.

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method, A-Buffer Method, Scan line and Depth Sorting, Area subdivision Method, Ray Casting Method.

Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).

Module – 3 (12 hours)

Multimedia Fundamentals: Introduction, Multimedia & Hypermedia, WWW, Multimedia software tools, Multimedia Authoring and Tools, Graphics and Image Data Representation, Color Models in images & video, Fundamental Concepts in Video, Basics of digital Audio.

Multimedia Data Compression: Lossless Compression Algorithms (Basics of Information Theory, Run length coding, variable length coding, lossless image compression), Lossy Compression Algorithms (distortion measure, quantization, Discrete Cosine transform), Basic Image Compression standard-JPEG, Basic Video Compression standard-MPEG (MPEG-1&2).

Text Books:

1. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-Nian Li and Mark S. Drew, "Fundamentals of Multimedia", First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. Jennifer Burg, "The Science of Digital Media", First Edition, 2009, Pearson Education Inc., New Delhi.
2. Francis S. Hill & Stephen M. Kelly, "Computer Graphics using OpenGL", Third Edition, 2007, PHI Learning Pvt. Ltd., New Delhi.
3. Zhigang Xiang, Roy A. Plastock, "Computer Graphics", Second Edition, 2007, McGraw-Hill Education (India), New Delhi.
4. Leen Ammeral, Kang Zhang, "Computer Graphics for Java Programmers", Second Edition, 2007, Wiley India Pvt. Ltd., New Delhi.
5. Edward A. Angel, "Interactive Computer Graphics: A Top-Down Approach Using OpenGL", Fifth Edition, 2009, Pearson Education Inc., New Delhi.