RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence and Data Science, V-Semester

AD 503 (B) Computer Graphics & Multimedia

COURSE OUTCOMES: After Completing the course student should be able to:

CO1: Describe input/output devices and their working principles along with the understanding of drawing algorithms.

CO2: State basic principles of 2D and 3D geometric transformations and summarize typical graphics pipeline

CO3: State the importance of viewing and projections, also understanding of curve generation algorithms.

CO4: Articulate various algorithms for scanning, filling, clipping and detecting visible surfaces.

CO5: Comprehend the fundamentals of animation, animation sequence, various audio, video, text, animation file formats and compression technique.

COURSE CONTENTS:

UNIT-I

Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Charactergeneration, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawingalgorithms: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circledrawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fillalgorithms.

UNIT-II

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. InverseTransformation, Homogeneous coordinate system, Matrices Transformation, CompositeTransformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System,Viewing Transformation, Line Clipping & Polygon Clipping Algorithms

UNIT-III

3-D Transformations: Translation, Rotation and Scaling. Parallel & PerspectiveProjection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depthcomparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm. Curvegeneration, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specularreflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY,HSV.

UNIT-IV

Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Directvolume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vectorfields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallelcoordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitivefoundations, Evaluation of visualization methods, Applications of visualization, Basic AnimationTechniques like traditional, key framing.

UNIT –V

Multimedia: Basic of multimedia, application of Multimedia, Text-Types, UnicodeStandard, text Compression, Text file formats, Audio Components, Digital Audio, Digital Audioprocessing, Sound cards, Audio file formats ,Audio Processing software ,Video-Video colorspaces, Digital Video, Digital Video processing, Video file formats. Animation: Uses of
Animation, Principles of Animation, Computer based animation, 3D Animation, Animation fileformats, Animation software, Special Effects in animation, Storyboarding for Animation, Compression: Lossless/Lossy Compression techniques, Image, Audio & Video Compression, MPEG Standards, Multimedia Architecture, Multimedia databases.

Recommended Text:
1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
2. Foley, Van Dam, Feiner, Hughes, "Computer Graphics: Principles and Practice" Addison-Wesley
3. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
4. Parekh "Principles of Multimedia" Tata McGraw Hill
5. Maurya, "Computer Graphics with Virtual Reality System ", Wiley India
6. Pakhira,"Computer Graphics, Multimedia& Animation",PHI learning
7. Andleigh, Thakral , "Multimedia System Design " PHI Learning
8. Khalid Sayood , "Introduction to Data Compression", Morgan Kaufmann

SUGGESTED LIST OF EXPERIMENTS FOR DEPARTMENTAL ELECTIVE LAB

1. Write a program to draw a line using DDA algorithm.

2.Write a program to draw a line through Bresenham's algorithms

3.Write a program to draw a line using Mid-Point algorithm.

4. Write a Program for drawing a circle using Bresenham's line drawing   algorithm

5. Write a Program to implementTranslation ofa line and triangle

6. Write a Program to implement Scaling of a lineand triangle.

7. Write a Program to implement Rotation of a lineand triangle .

8.Write a Program showing line clipping using cohen -sutherland   line clipping algorithm.

9.Write a program on Boundary fill and flood fill algorithm implementation.

10.Write a program for performing the basic transformations such as translation, Scaling, Rotation for a given 3D object.

11. Write a Program on Bezier methods for drawing curves.

12. Using Flash/Maya perform different operations (rotation, scaling move etc.) on objects.

13. Create a Bouncing Ball using Key frame animation and Path animation.

14.Create animations using Adobe FLASH. Flash Drawing and Painting Tools. Flash Drawing Modes. Pencil Tools.

15.To create a Jpeg image that demonstrates the various features of an image editing tool.

16. To develop a presentation for a product using techniques like Guide Layer, masking and onionSkin using authoring tools.

17. To perform basic operations on image using any image editing software.

18. Draw a colour cube and spin it using OpenGL transformation matrices.

19. To Create Animation using any authoring tool.

20. Write a program to play "wave" or "MIDI "file format sound files.