LABORATORY MANUAL

CS-4508 Computer Graphics & Multimedia

Devi Ahilya Vishwavidyalaya

School of Computer Science & IT

"We make things happen . . ."
Producing world – class
IT Professionals
Since 1986

www.scs.dauniv.ac.in

MISSION OF SCS

- *To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.*
- *To produce international quality IT professionals, who can independently design, develop and implement computer applications.*
- *To develop professionals who dedicate themselves to mankind, are environment conscious, follow social norms and ethics.*

SCHOOL OF COMPUTER SCIENCE & IT
DEVI AHILYA VISWAVIDYALAYA
Takshashila Campus, Khandwa Road, Indore – 452017

CS-4508 Computer Graphics & Multimedia

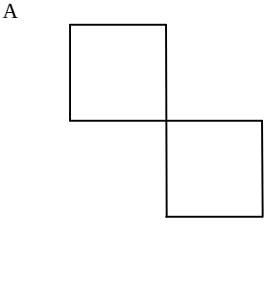
AIM:

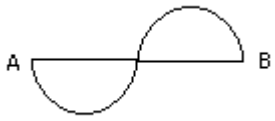
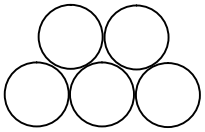
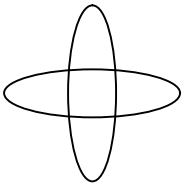
This course aims to combine theoretical approaches with modern techniques of computer graphics and multimedia to design graphics software systems.

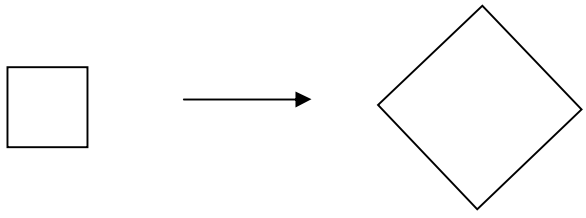
OBJECTIVES:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
3. To provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
4. To learn the basic principles of 3-dimensional computer graphics.
5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
6. To comprehend and analyse the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.

ASSIGNMENTS SCHEDULE:

Week	Topic
Week 1	**Assignment 1:** 1. Write a program to implement DDA algorithm. 2. What are the characteristics of Video Display Devices? 3. Compare and contrast the operating characteristics of Raster Refresh Systems, Plasma Panels and LCDs. 4. Write application of CG in Education and Training. 5. Compare Refresh type and Storage type CRT display. 6. Write a program to draw the following figure:-  All sides are equal and point A and B is input.
Week 2	**Assignment 2:** 1. Write a program to implement Bresenham's line algorithm. 2. What are the advantages of Bresenham's line algorithm over DDA algorithm. 3. How can the Bresenham's line algorithm be modified to accommodate all types of lines? 4. Modify the Bresenham's line algorithm so that it will produce a dashed-line pattern. Dash length should be independent of slope.

	5. Write a program to implement Midpoint circle generating algorithm.
Week	**Topic**
Week 3	**Assignment 3:** 1. Write a program to implement Bresenham's circle generating algorithm. 2. Differentiate between Midpoint & Bresenham's circle generating algorithm. 3. Write short note on different input devices. 4. Write a program to draw the following figure:-  Point A and B is input. 5. Write a program to draw the following figure:-  Input is radius of circle as r.
Week 4	**Test-1**
Week 5	**Assignment 4:** 1. Write a program to implement outline character. 2. Write a program to implement bitmap character. 3. Write a program to implement ellipse generating algorithm 4. Write a program to draw the following figure:-  Input is rx, ry and center coordinates.
Week 6	**Assignment 5:** 1. Write a procedure to scan the interior of a specified ellipse into a solid color. 2. Modify the 4-connected boundary fill algorithm to avoid excess stacking. 3. Write the Scan line filling algorithm.
Week 7	**Assignment 6:** 1. Write a short note on viewing transformation. 2. Distinguish between viewport and window. 3. What do you mean by normalization transformation? Why it is needed? 4. Write a program to implement Line Clipping Algorithm using Cohen Sutherland Algorithm. 5. Write a program to implement Line Clipping Algorithm using Liang Barsky Algorithm. 6. Explain the Sutherland and Cohen subdivision algorithm for the line clipping. 7. Explain Liang-Barsky line clipping algorithm.

Week	Topic
Week 8	**Assignment 7:** 1. Explain Sutherland-Hodgeman algorithm for polygon clipping. 2. Write a program to Implement Polygon Clipping Algorithm using Sutherland -Hodgman Algorithm. 3. Modify the Liang-Barsky line clipping algorithm to polygon clipping. 4. What do you mean by interior and exterior clipping? 5. Explain how exterior clipping is useful in multiple window environments.
Week 9	**Test-2**
Week 10	**Assignment 8:** 1. Write a program to implement scaling on polygon. 2. Write a program to implement transferring on polygon. 3. Write a program to implement rotation on polygon. 4. Write a program to implement reflection on polygon. 5. Write a Program to implement set of Basic Transformations on Polygon i.e. Translation,Rotation and Scaling.
Week 11	**Assignment 9:** 1. Why are matrices used for implementing transformations? 2. What is the significance of homogeneous co-ordinates? Give the homogeneous co-ordinates for the basic transformations. 3. Write a program to implement set of Composite Transformations on Polygon i.e Reflection, Shear (X &Y), rotation about an arbitrary point. 4. Derive the transformation matrix for rotation about an arbitrary axis. 5. Derive the transformation matrix for rotation about an arbitrary plane.
Week 12	**Assignment 10:** 1. Find a transformation of triangle (coordinates will be given) by Rotating 45 degree about the origin and then translating one unit in X and Y direction. 2. Derived transformation matrix for the following figure.  A B 3. Determine the sequence of basic transformations that are equivalent to the x-direction and y-direction shearing matrix. 4. Show that two successive reflections about any line passing through the coordinate origin is equivalent to single rotation about the origin. 5. Show that transformation matrix for a reflection about the line y=x, is equivalent to a reflection relative to the x axis followed by a counterclockwise rotation of 90 degrees.

Week	Topic
Week 13	**Assignment 11:** 1. Problems on 3-Dimension transformation. 2. What are different types of projection? Derive a matrix representation for perspective transformation? What are different perspective anomalies? 3. Case Study of Multimedia Tool and to design an multimedia application.
Week 14	**Test-3**

Resources:

- Donald Hearn, M. Pauline Baker, "Computer Graphics", C version, 2nd edition Prentice-Hall.
- Zhigang Xiang, Roy A. Plastock,Schaum's outline of "Theory and Problems of computer graphics", 2nd edition, McGraw-Hill.
- James D. Foley , Andries van Dam , Steven K. Feiner , John F. Hughes, "Computer Graphics: Principles and Practice in C" , 2nd edition, Addison-Wesley Professional.

****