

# LABORATORY MANUAL

## CS-3505 Computer Graphics & Multimedia Fundamentals



**Devi Ahilya Vishwavidyalaya**

School of Computer Science & IT

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# CS-3505 Computer Graphics & Multimedia Fundamentals

## AIM:

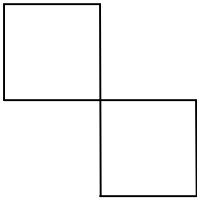
The aim of the course is to provide students a good understanding of basic concepts of computer graphics and the need of developing graphics applications.

## OBJECTIVES:

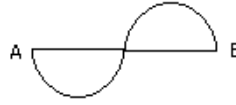
The objectives of the course are to:

- Understand the need of developing graphics applications.
- Learn the hardware involved in building graphics applications.
- Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon.
- Learn the representation and transformation of graphical images and pictures.
- Learn the concept of Color Generation.

## ASSIGNMENTS SCHEDULE:

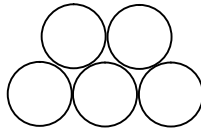
Week	Topic
Week 1	<b>Assignment 1:</b> <ol style="list-style-type: none"><li>1. What are the characteristics of Video Display Devices?</li><li>2. Compare and contrast the operating characteristics of Raster Refresh Systems, Plasma Panels and LCDs.</li><li>3. Write application of CG in Education and Training.</li><li>4. Compare Refresh type and Storage type CRT display.</li></ol>
Week 2	<b>Assignment 2:</b> <ol style="list-style-type: none"><li>1. Write a program to implement DDA algorithm.</li><li>2. Write a program to draw the following figure:- <p style="text-align: center;">A</p><p style="text-align: center;">B</p><p>All sides are equal and point A and B is input.</p></li><li>3. Write a program to implement Bresenham's line algorithm.</li><li>4. What are the advantages of Bresenham's line algorithm over DDA algorithm.</li><li>5. How can the Bresenham's line algorithm be modified to accommodate all types of lines?</li><li>6. Modify the Bresenham's line algorithm so that it will produce a dashed-line pattern. Dash length should be independent of slope.</li></ol>
Week 3	<b>Assignment 3:</b> <ol style="list-style-type: none"><li>1. Write a program to implement Midpoint circle generating algorithm.</li><li>2. Write a program to implement Bresenham's circle generating algorithm.</li><li>3. Differentiate between Midpoint &amp; Bresenham's circle generating algorithm.</li></ol>

4. Write short note on different input devices.
5. Write a program to draw the following figure:-



Point A and B is input.

6. Write a program to draw the following figure:-



Input is radius of circle as r.

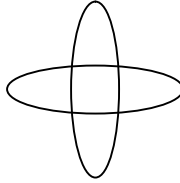
**Week 4**

**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**

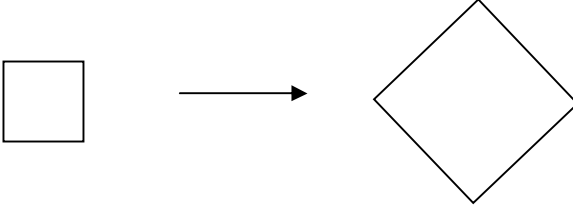
**Assignment 5:**

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 Sutherland and Cohen subdivision algorithm for the line clipping.
7. Explain Liang-Barsky line clipping algorithm.

<b>Week 8</b>	<b>Assignment 7:</b> <ol style="list-style-type: none"> <li>1. Explain Sutherland-Hodgeman algorithm for polygon clipping.</li> <li>2. Write a program to Implement Polygon Clipping Algorithm using Sutherland -Hodgman Algorithm.</li> <li>3. Modify the Liang-Barsky line clipping algorithm to polygon clipping.</li> <li>4. What do you mean by interior and exterior clipping?</li> <li>5. Explain how exterior clipping is useful in multiple window environments.</li> </ol>
<b>Week 9</b>	<b>Test-2</b>
<b>Week 10</b>	<b>Assignment 8:</b> <ol style="list-style-type: none"> <li>1. Write a program to implement scaling on polygon.</li> <li>2. Write a program to implement transferring on polygon.</li> <li>3. Write a program to implement rotation on polygon.</li> <li>4. Write a program to implement reflection on polygon.</li> <li>5. Write a Program to implement set of Basic Transformations on Polygon i.e. Translation,Rotation and Scaling.</li> </ol>
<b>Week 11</b>	<b>Assignment 9:</b> <ol style="list-style-type: none"> <li>1. Why are matrices used for implementing transformations?</li> <li>2. What is the significance of homogeneous co-ordinates? Give the homogeneous co-ordinates for the basic transformations.</li> <li>3. Write a program to implement set of Composite Transformations on Polygon i.e Reflection,Shear (X &amp;Y), rotation about an arbitrary point.</li> <li>4. Derive the transformation matrix for rotation about an arbitrary axis.</li> <li>5. Derive the transformation matrix for rotation about an arbitrary plane.</li> </ol>
<b>Week 12</b>	<b>Assignment 10:</b> <ol style="list-style-type: none"> <li>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.</li> <li>2. Derived transformation matrix for the following figure.</li> </ol> <div style="text-align: center; margin: 20px 0;">  <p style="margin: 0;">A <span style="margin-left: 100px;">→</span> B</p> </div> <ol style="list-style-type: none"> <li>3. Determine the sequence of basic transformations that are equivalent to the x-direction and y-direction shearing matrix.</li> <li>4. Show that two successive reflections about any line passing through the coordinate origin is equivalent to single rotation about the origin.</li> <li>5. Show that transformation matrix for a reflection about the line <math>y=x</math>, is equivalent to a reflection relative to the x axis followed by a counterclockwise rotation of 90 degrees.</li> </ol>
<b>Week 13</b>	<b>Revision</b>
<b>Week 14</b>	<b>End Semester Lab Exam</b>