

LABORATORY MANUAL

CS-4508 Computer Graphics & Multimedia

**M.Sc. (C.S.) III Semester
July-December 2009**

**SCHOOL OF COMPUTER SCIENCE & IT,
DAVV, INDORE**

AIM:

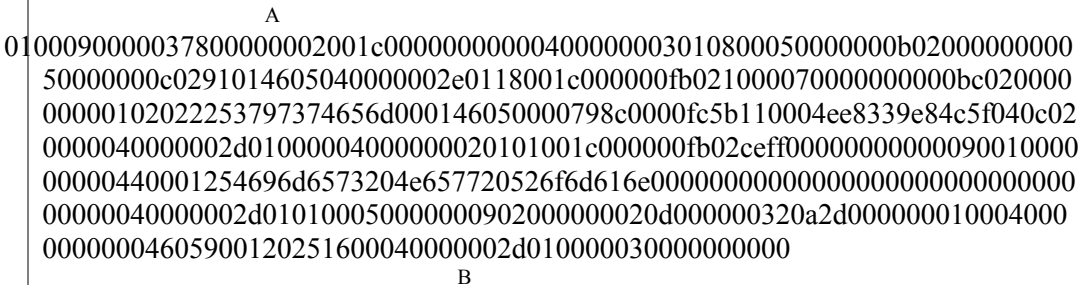
The aim of the course is to give students a good understanding of basic concepts of computer graphics and the need of developing graphic applications.

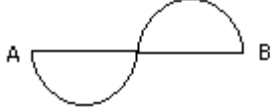
OBJECTIVES:

The objectives of the course are to:

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

ASSIGNMENTS SCHEDULE:

Week	Topic	Remark
Week 1	Assignment 1: <ol style="list-style-type: none"> 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:- <div style="text-align: center;">  <p style="text-align: center;">A</p> <p style="text-align: center;">B</p> </div> <p style="text-align: center;">All sides are equal and point A and B is input.</p> 	
Week 2	Assignment 2: <ol style="list-style-type: none"> 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	Remark

Week 3	Assignment 3: <ol style="list-style-type: none"> 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:-  <p>Point A and B is input.</p> <ol style="list-style-type: none"> 5. Write a program to draw the following figure:- 0100090000037800000002001c0000000000400000003010800050000000b0 200000000050000000c0291014605040000002e0118001c000000fb021000070 000000000bc0200000000102022253797374656d000146050000798c0000fc5 b110004ee8339e84c5f040c020000040000002d01000004000000020101001c0 00000fb02ceff0000000000009001000000000440001254696d6573204e65772 0526f6d616e00000000000000000000000000000000040000002d01010005 0000000902000000020d000000320a2d000000010004000000000460590012 0251600040000002d010000030000000000 Input is radius of circle as r. 	
Week 4	Test-1	
Week 5	Assignment 4: <ol style="list-style-type: none"> 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:- 0100090000037800000002001c0000000000400000003010800050000 000b0200000000050000000c0291014605040000002e0118001c000000f b021000070000000000bc0200000000102022253797374656d0001460 50000798c0000fc5b110004ee8339e84c5f040c020000040000002d01000 004000000020101001c000000fb02ceff000000000000900100000000044 0001254696d6573204e657720526f6d616e000000000000000000000000 000000000040000002d010100050000000902000000020d000000320a 2d00000001000400000000004605900120251600040000002d01000003 0000000000 Input is rx, ry and center coordinates. 	
Week 6	Assignment 5: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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	Remark
Week 8	Assignment 7: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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. <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>0100090000037800000002001c0000000000400000003010800050000000b02000000 00050000000c0291014605040000002e0118001c000000fb021000070000000000bc020 00000000102022253797374656d000146050000798c0000fc5b110004ee8339e84c5f040 c020000040000002d01000004000000020101001c000000fb02ceff00000000000090010 00000000440001254696d6573204e657720526f6d616e0000000000000000000000000 00000000040000002d010100050000000902000000020d000000320a2d000000010004 00000000004605900120251600040000002d010000030000000000</p> <p>A</p> </div> <div style="text-align: center;"> <p>B</p> </div> </div> 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	Remark
Week 13	Assignment 11: <ol style="list-style-type: none"> 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? 	
Week 14	Test-3	

Resources:

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