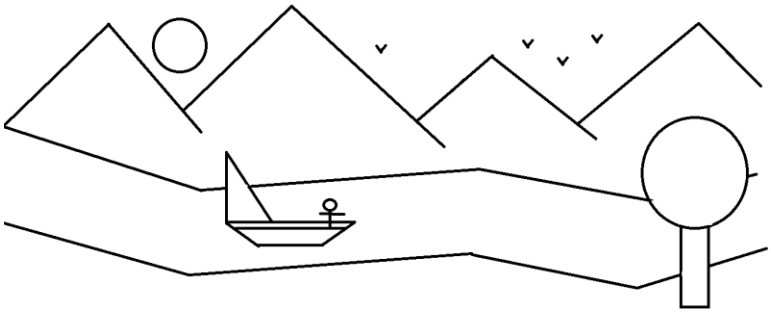
5 - Years Integrated M.Sc. (IT) (Semester - 5) Practical List IT5015 - Fundamentals of Computer Graphics	
Practical No : 1	**Enrollment No:**
Practical Problems	1. Write a program to draw line or list line pixel using line equation y=mx + b. 2. Write a program to draw line or list line pixel using DDA algorithm. 3. Write a program to draw line or list line pixel using BRASENHAM algorithm.
Objective(s)	Students will be able to • Draw line and circle using different algorithm. • Compare algorithm.
Pre-requisite	Slope of the line, equation of line, circle equation, 8 - symmetry of circle
Duration for completion	6 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6**: Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	CO1: Understand the basic concept of computer graphics, display devices and raster graphics algorithms.
Solution must contain	Algorithm Code Sample calculation (Tracing algorithm upto 5 points)
Nature of submission	Handwritten
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. List pros and cons of line drawing using equation. 2. List pros and cons of line drawing using DDA algorithm. 3. List pros and cons of line drawing using BRASENHAM algorithm. 4. What is initial decision parameter in BRASENHAM line drawing algorithm? 5. What is initial decision parameter in BRASENHAM circle drawing algorithm? 6. Compare execution time for line drawing algorithm for above three methods. Which one run faster? Why?

Objectives	Solution achieves the desire the desired objective(s)	Signature
To be able to draw line		
To be able to draw circle		
To be able to compare algorithm		

Practical No : 2	**Enrollment No:**
Practical Problems	4. Write a program to draw a circle using BRESENHAM algorithm. 5. Write a menu driven program to input user choice as follows: Display line using DDA algorithm Display line using BRESENHAM algorithm Display circle using BRESENHAM algorithm 6. Write a program to input coordinates of two line segment. Display both the line and highlight intersection point. Display appropriate message if line segments are parallel or not intersecting. 7. Display three characters of your name in English using stroke method. 8. Display three characters of your name in Gujarati using bitmap method. 9. Modify DDA line algorithm to generate 5 – pixel thick line. 10. Modify DDA line algorithm to generate line with the pattern(dash line, dotted line, dot-dash line).
Objective(s)	Students will be able to • Draw line and circle using different algorithm. • Draw characters using stroke and bitmap methods.
Pre-requisite	Slope of the line, equation of line, circle equation, 8 - symmetry of circle
Duration for completion	6 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6**: Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	CO1: Understand the basic concept of computer graphics, display devices and raster graphics algorithms.
Solution must contain	Code
Nature of submission	Handwritten
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. What is 8-Symmetry in circle drawing? 2. How to calculate intersection point of two lines? 3. What are the different thick line caps? 4. Why need for thick line cap and joins? 5. How to generate line using pattern?

Objectives	**Solution achieves the desire the desired objective(s)**	**Signature**
To draw line and circle		
To be able to draw characters		
To be able to draw different types of line		

Practical No : 3	**Enrollment No:**
Practical Problems	11. Write a program to implement display file concept. Insert more than two lines in display file. Display it using display file interpreter program. 12. Write a program to add N – edge polygon in display file. Display it using display file interpreter program. 13. Write a program to display following using display file concept.  14. Write a program to display any one from the following using display file. A bus, A car, A windmill, A kite in the sky, A man, A cycle, A train 15. Write a program to input an N- edge polygon in display file (randomly) and a point. Using odd even method display message point is inside or outside. Display polygon and a point on screen. 16. Modify program 15 and perform inside test using winding number method.
Objective(s)	Students will be able to • Draw polygon. • Draw objects using display file concept. • Perform inside tests.
Pre-requisite	Line and circle functions, formula for finding intersection point.
Duration for completion	3 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6:** Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	**CO2:** Describe and illustrate polygon inside tests and filling algorithms.
Solution must contain	Code
Nature of submission	Handwritten/print
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. Differentiate between two inside tests. 2. Why inside test is not appropriate for filling polygon?

Objectives	Solution achieves the desire the desired objective(s)	Signature
Able to draw objects		
Able to do Inside test		
Able to use display file concept		

Practical No : 4	**Enrollment No:**
Practical Problems	17. Write a program to display intersection points of a scan line and a polygon. 18. Write a program to fill polygon using scan fill algorithm. 19. Write a program to fill polygon using boundary fill algorithm. 20. Write a program to fill polygon using flood fill algorithm.
Objective(s)	Students will be able to • Fill the polygon
Pre-requisite	drawing polygon
Duration for completion	3 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6**: Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	**CO3:** Deriving and applying geometric transformation to 2D objects.
Solution must contain	Code
Nature of submission	Handwritten/print
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. Differentiate between scan fill and flood fill algorithm. 2. In which situation scan fill algorithm is best? 3. In which situation flood fill algorithm is best?

Objectives	**Solution achieves the desire the desired objective(s)**	**Signature**
To fill polygon using scan fill		
To fill polygon using boundary fill		
To compare filling algorithm		

Practical No : 5	**Enrollment No:**
Practical Problems	21. Write a program to shift an object in X direction, in Y direction and in both XY direction. Display original position as well as final position. 22. Write a program to scale an object by scaling factor as given below. Display original as well as transformed object. S_x=0.6, S_y=0.6 S_x=1.3, S_y=1.3 S_x=0.6, S_y=0.4 S_x=2, S_y=3 23. Perform fix point scaling on house object by keeping one point as fixed point. Take scaling factor of your choice. 24. Write a program to display kite which shift in XY direction on screen. Take care that object must not move outside the screen. 25. Write a program to display kite in the middle of the screen. Display it again after applying fix point scaling with respect to center point. Modify program to generate animation which shows shrinking and expanding kite.
Objective(s)	Students will be able to • Perform translation • Perform scaling • Perform fix-point scaling
Pre-requisite	
Duration for completion	3 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6**: Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	**CO3:** Deriving and applying geometric transformation to 2D objects.
Solution must contain	Code
Nature of submission	Handwritten/print
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. What is transformation? 2. What is translation? 3. What are the problems occurred when scaling is applied?

Objectives	**Solution achieves the desire the desired objective(s)**	**Signature**
To perform translation		
To perform scaling		
To perform fix point scaling		

Practical No : 6	**Enrollment No:**
Practical Problems	26. Write a program to rotate an object by Theta degree with respect to origin. Display original position as well as final position. 27. Extend above program and display animation with 360 degree rotation. Keep (0, 0) at the middle of the screen and draw the quadrants. 28. Write a program to display line and rotate it on its center point. 29. Write a program to display rotating wheel at the same place. (wheel - circle containing one horizontal and one vertical line.) 30. Write a program to perform rotation on any two of the following : A windmill, a marry-go-round, a ceiling fan, a table fan, a kite (rotating on bottom point), a square with diagonal lines (rotating on center point), a rod rotating on center point.
Objective(s)	Students will be able to • Perform rotation with respect to origin • Perform rotation with respect to fix point • Perform animation
Pre-requisite	matrix operations
Duration for completion	3 hours
PEO(s) to be achieved	**PEO1**: To provide sound foundation in the fundamentals of computer application along with analytical, problem-solving, design and communication skill for life-long learning in chosen field. **PEO2**: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	**PO6**: Ability to use the techniques, skills and modern tools as necessary for software development.
CO(s) to be achieved	**CO3:** Deriving and applying geometric transformation to 2D objects.
Solution must contain	Code
Nature of submission	Handwritten/print
Reference for solving the problem	Book: Donald D. Hearn, M. Pauline Baker. Computer Graphics C Version, Pearson
Post laboratory questions	1. What is CW and CCW rotation? Write its transformation matrices. 2. What are the steps to perform fix point rotation?

Objectives	**Solution achieves the desire the desired objective(s)**	**Signature**
To perform rotation wrt origin		
To perform rotation wrt fix point		
To perform rotation animation		