Experiment No 1.

Aim: To implement DDA algorithms for drawing a line segment between two given end points.

Objective: Draw the line using (vector) generation algorithms which determine the pixels that should be turned ON are called as digital differential analyzer (DDA).It is one of the techniques for obtaining a rasterized straight line. This algorithm can be used to draw the line in all the quadrants.

Theory:
DDA algorithm is an incremental scan conversion method. Here we perform calculations at each step using the results from the preceding step. The characteristic of the DDA algorithm is to take unit steps along one coordinate and compute the corresponding values along the other coordinate. Digital Differential Analyzer (DDA) algorithm is the simple line generation algorithm which is explained step by step here.

Algorithm:

Step1: Start Algorithm

Step2: Declare x_1,y_1,x_2,y_2,dx,dy,x,y as integer variables.

Step3: Enter value of x_1,y_1,x_2,y_2.

Step4: Calculate dx = x_2-x_1

Step5: Calculate dy = y_2-y_1

Step6: If ABS (dx) > ABS (dy)
Then step = abs (dx)
Else

Step7: x_{inc}=dx/step
y_{inc}=dy/step
assign x = x_1
assign y = y_1

Step8: Set pixel (x, y)

Step9: x = x + x_{inc}
y = y + y_{inc}

Set pixels (Round (x), Round (y))

Step10: Repeat step 9 until $x = x_2$

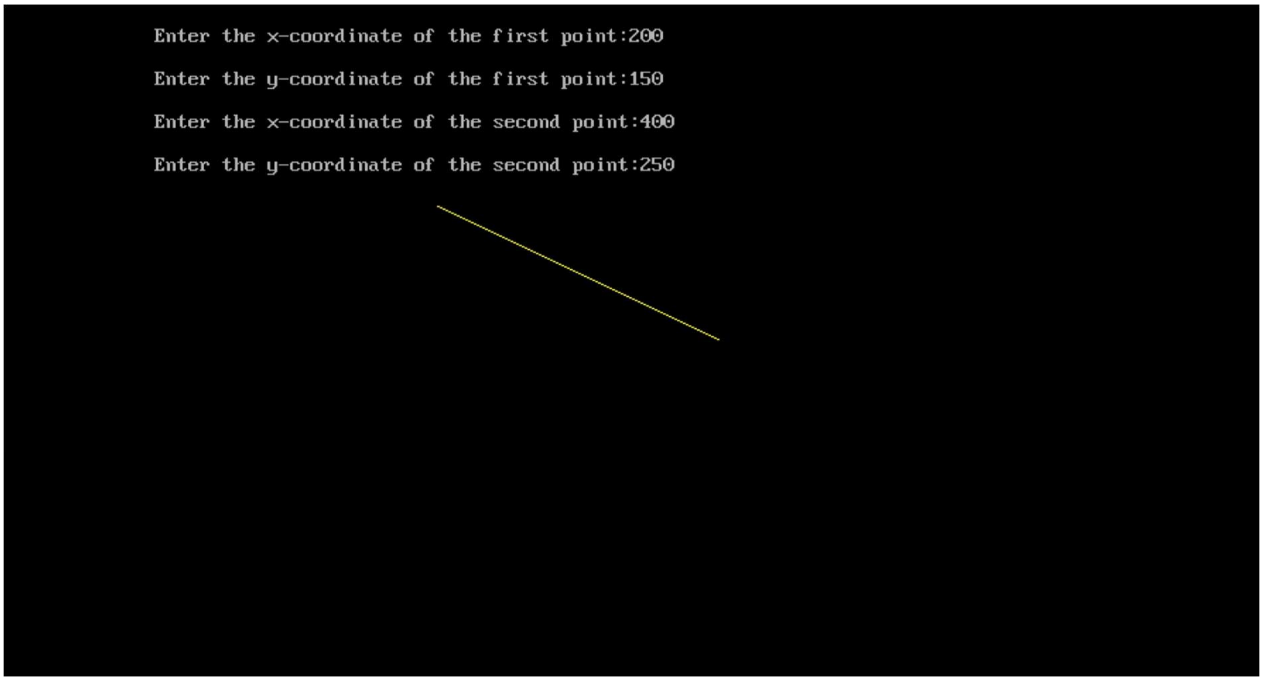
Step11: End Algorithm

Program:

```
#include<graphics.h>
#include<stdio.h>
#include<math.h>
#include<dos.h>
int main()
{
        float x,y,x1,y1,x2,y2,dx,dy,step;
int i,gd=DETECT,gm;
//detectgraph(&gd,&gm);
        initgraph(&gd,&gm,"");
        printf("\nEnter the x-coordinate of the first point:");
        scanf("%f",&x1);
        printf("\nEnter the y-coordinate of the first point:");
        scanf("%f",&y1);
        printf("\nEnter the x-coordinate of the second
point:");         scanf("%f",&x2);
        printf("\nEnter the y-coordinate of the second
point:");         scanf("%f",&y2);       dx=abs(x2-x1);
dy=abs(y2-y1);          if(dx>dy)
        {
                step=dx;
        }
        else
        {
                step=dy;
        }
        dx=dx/step;
dy=dy/step;
x=x1;  y=y1;
        i=1;
        while(i<=step)
        {
                putpixel(x,y,14);
```

```
                x=x+dx;
        y=y+dy;
i=i+1;
                delay(100);
        }
        getch();
        closegraph();
}
```

Output:



Conclusion: Comment on –

1. Pixel

A pixel (short for "picture element") is the smallest unit of a digital image or display. It repre sents a single point in a graphic image. Pixels are the building blocks of any visual display; each one contributes to the overall image resolution and color depth. When combined, thous ands or millions of pixels can form complex images, with each pixel holding specific color i nformation.

2. Equation for line

The standard equation for a line in a two-dimensional plane is: [y = mx + b] Where:

- y is the y-coordinate,
- m is the slope of the line,
- x is the x-coordinate,
- b is the y-intercept.

This equation can be used to determine the position of any point along the line given its x or y coordinate. It's a fundamental concept in algebra and graphics

3.Need of line drawing algorithm

Line drawing algorithms are essential in computer graphics for several reasons:

- Accuracy: Ensure that lines are drawn accurately and uniformly.
- Efficiency: Optimize the process of rendering lines, especially on pixel-based displays.
- Hardware Constraints: Address limitations of raster devices, ensuring lines are smoo th and visually appealing.
- Foundational: Serve as a basis for more complex rendering algorithms, such as poly gon filling and text rendering.

4.Slow or fast

The speed of line drawing algorithms can vary:

- DDA Algorithm: Uses floating-point arithmetic, making it slower but more accurate.
- Bresenham's Algorithm: Utilizes integer arithmetic, making it faster and suitable for real-time applications. It's generally preferred for its efficiency and simplicity