Experiment No. 9
Implement Character Generation method : Bit Map method
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Date of Performance:
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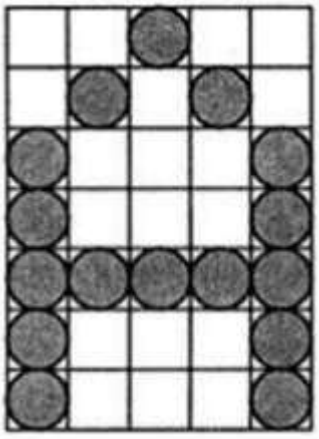
Experiment No. 9

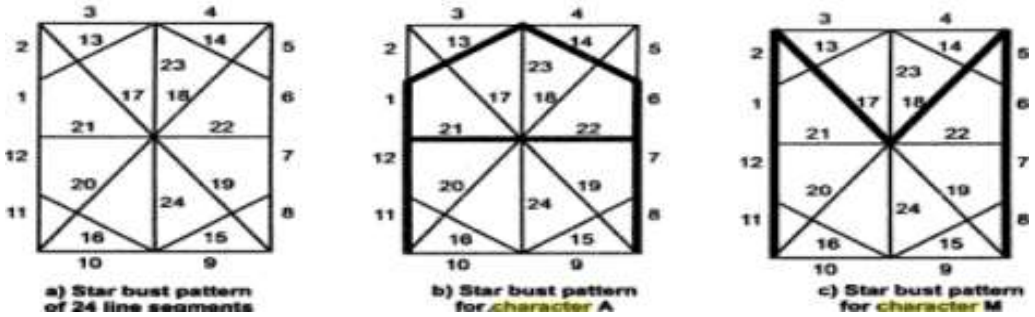
Aim: To implement Character Generation: Bit Map Method

Objective:
Identify the different Methods for Character Generation and generate the character using Stroke

Theory:
Bit map method –
Bitmap method is a called dot-matrix method as the name suggests this method use array of bits for generating a character. These dots are the points for array whose size is fixed.
· In bit matrix method when the dots are stored in the form of array the value 1 in array represent the characters i.e. where the dots appear we represent that position with numerical value 1 and the value where dots are not present is represented by 0 in array.
· It is also called dot matrix because in this method characters are represented by an array of dots in the matrix form. It is a two-dimensional array having columns and rows.
A 5x7 array is commonly used to represent characters. However, 7x9 and 9x13 arrays are also used. Higher resolution devices such as inkjet printer or laser printer may use character arrays that are over 100x100.



Starburst method –
In this method a fix pattern of line segments is used to generate characters. Out of these 24-line segments, segments required to display for particular character are highlighted. This method of character generation is called starburst method because of its characteristic appearance. The starburst patterns for characters A and M. the patterns for particular characters are stored in the form of 24 bit code, each bit representing one line segment. The bit is set to one to highlight the line segment; otherwise, it is set to zero. For example, 24-bit code for Character A is 0011 0000 0011 1100 1110 0001 and for character M is 0000 0011 0000 1100 1111 0011.



Program:

```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
int main()
{
   int i,j,k,x,y;
   int gd=DETECT,gm;//DETECT is macro defined in graphics.h
   /* ch1 ch2 ch3 ch4 are character arrays that display alphabets */
   int ch1[][10]={ {1,1,1,1,1,1,1,1,1,1},
                   {1,1,1,1,1,1,1,1,1,1},
                   {0,0,0,0,1,1,0,0,0,0},
                   {0,0,0,0,1,1,0,0,0,0},
                   {0,0,0,0,1,1,0,0,0,0},
                   {0,0,0,0,1,1,0,0,0,0},
                   {0,0,0,0,1,1,0,0,0,0},
                   {0,1,1,0,1,1,0,0,0,0},
                   {0,1,1,0,1,1,0,0,0,0},
                   {0,0,1,1,1,0,0,0,0,0}};
   int ch2[][10]={ {0,0,0,1,1,1,1,0,0,0},
                   {0,0,1,1,1,1,1,1,0,0},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {0,0,1,1,1,1,1,1,0,0},
                   {0,0,0,1,1,1,1,0,0,0}};
   int ch3[][10]={ {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
                   {1,1,1,1,1,1,1,1,1,1},
                   {1,1,1,1,1,1,1,1,1,1},
                   {1,1,0,0,0,0,0,0,1,1},
```

```
            {1,1,0,0,0,0,0,0,1,1},
            {1,1,0,0,0,0,0,0,1,1},
            {1,1,0,0,0,0,0,0,1,1}};
int ch4[][10]={ {1,1,0,0,0,0,0,0,1,1},
            {1,1,1,1,0,0,0,0,1,1},
            {1,1,0,1,1,0,0,0,1,1},
            {1,1,0,1,1,0,0,0,1,1},
            {1,1,0,0,1,1,0,0,1,1},
            {1,1,0,0,1,1,0,0,1,1},
            {1,1,0,0,0,1,1,0,1,1},
            {1,1,0,0,0,1,1,0,1,1},
            {1,1,0,0,0,0,1,1,1,1},
            {1,1,0,0,0,0,0,0,1,1}};
initgraph(&gd,&gm," ");//initialize graphic mode
setbkcolor(LIGHTGRAY);//set color of background to darkgray
for(k=0;k<4;k++)
{
   for(i=0;i<10;i++)
   {
      for(j=0;j<10;j++)
      {
         if(k==0)
         {
            if(ch1[i][j]==1)
            putpixel(j+250,i+230,RED);
         }
         if(k==1)
         {
            if(ch2[i][j]==1)
            putpixel(j+300,i+230,RED);
         }
         if(k==2)
         {
            if(ch3[i][j]==1)
            putpixel(j+350,i+230,RED);
         }
         if(k==3)
         {
            if(ch4[i][j]==1)
            putpixel(j+400,i+230,RED);
         }
      }
      delay(200);
   }
}
getch();
closegraph();
```

}

Output -

Conclusion:

1. Various Approaches to Bitmaps: Bitmaps serve as digital images constructed from individual pixels. Monochrome bitmaps utilize just one bit to represent binary colors such as black and white. Grayscale bitmaps, on the other hand, employ multiple bits to convey different shades of gray, while color bitmaps use more bits or bytes to display a wide spectrum of colors. Bitmaps are a type of raster graphics characterized by fixed resolutions, which offer intricate details but pose challenges when resizing without encountering pixelation. They can be compressed in two ways, either losslessly (without quality loss) or lossily (with some quality loss), and can be meticulously edited at the pixel level using image editing software.
2. Benefits of the Stroke Method: The stroke method offers a notable advantage in terms of precise character design control. It enables customization of characters regarding their shape, size, and style by manipulating the pixel grid. Each character is represented as a collection of 1s (indicating "on" pixels) and 0s (indicating "off" pixels), simplifying the creation of distinctive character designs.
3. Limitation of the Stroke Method: While the stroke method provides meticulous character design control, its suitability predominantly lies in rendering characters with a pixelated or bitmapped appearance. The limitation of this method becomes apparent

when attempting to scale it for generating characters with smooth curves or fonts featuring anti-aliased edges. It excels in achieving a retro or pixel art aesthetic but might not be the optimal choice for modern, high-resolution, or anti-aliased text rendering, where more advanced text rendering techniques are preferred.